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GENERAL INDEX.

INDEX TO PLATES.

Agriculture.

WHEAT RUST.—(*Continued.*)

If in the course of the winding of this living stream the matter which forms it should meet with nothing suitable to it as food, as a rule, it perishes. But if it should happen to fall into suitable nourishing material, as, for instance, if it be lying on the surface of a wheat-leaf, and in the course of its windings, should happen to fall into a stoma, or breathing-spore of the plant, then, meeting with suitable nourishment in the interior of the wheat plant, it commences to grow vigorously, branching out and ramifying in all directions, producing an interlaced mass of threads or fibres. From this mass of interwoven threads there will grow forth pedicels bearing a fresh crop of red oval bodies, which, pushing their way outwards to the surface of the wheat plant, again present the characteristic pustular appearance.

Now, these red oval bodies are called "spores"; the mass of fine ramifying threads, from which the stalks or pedicels arise, is known as "mycelium," and the whole organism, consisting of mycelium, stalks, and spores is one of the lower fungus plants. It belongs to a scale of life in which we find such low forms as the green mould growing on cheese and on other provisions, and the various mildews and moulds which are common in all damp secluded places. If some of the common green mould be examined under the microscope a mass of mycelium will be seen which ramifies in the cheese on which the fungus has established itself, and from this mycelium arise the stalks or pedicels upon which are born the spores.

One important difference will be noticeable between this green mould and the rust fungus—namely, that while the rust pedicles sppport only one spore each, the green mould pedicels carry several, which are arranged in three or four chains, like beads on a thread. Low forms of fungoid life, similar to the rust fungus and to the ordinary mildews, exist in the world in countless numbers and in great variety, and are responsible for many of the commoner and most disastrous diseases of crops. The mildews of onion, turnip, corn, grass, and peas; the rot of turnips, cabbages, potatoes, &c.; the smut of corn, onions, and potatoes; the bunt or smut of wheat; the egrot or smut of barley; these and many other diseases are the work of these fungoid pests.

When the rust mycelium once gets into the wheat plant, it goes on growing until it forms a pustule, bearing spores. From the pustule thus formed is shed a little cloud of the red spores, which, being carried about by the breeze, are deposited both on the plant that bore them and on the neighbouring plants for some distance around. Thus there may be in a field, at first, only a dozen or so plants attacked by the rust, and these few plants would, in all probability, pass unnoticed; but from them are scattered and carried by the breeze enough spores to cause in a few days an outbreak of the disease through the entire crop, and it is only after this general outbreak has occurred that the disease is first noticed by the ordinary observer.

This growth and rapid multiplication goes on during the whole summer, being most active in moist, warm, calm weather.

But towards the end of the wheat-growing season a change takes place in the development of the fungus, and amongst the red pustules black ones make their appearance, the wheat becoming covered with what, to the naked eye, seem to be dark grey or light grey streaks and blotches. The black pustules vary considerably in size, being sometimes larger and sometimes smaller, and generally fewer in number, than the red ones.

The spores in this black stage, unlike the red ones, are double, being divided across the middle. The black spores also differ from the red ones, not

only in appearance, but also in habit, for whereas the red ones are capable of germinating quickly, and readily perish, unless placed under favourable conditions, the black ones, as a rule, require to remain all through the autumn and winter, and cannot germinate until the spring. On account of the long rest they require before germination, and because they are the last spores in the series, they have received the name of resting, or "telento" spores.

If, in the springtime, some of these spores be taken from old rusted straw and placed on a microscope slide in a thin film of water, the slide being placed on a damp cloth, and covered with inverted glass, the spores will in a shorter or longer time germinate, but it will be observed that the growth proceeding out of the black spore is quite different from what proceeds out of the red spore. This growth from the black rust spore is the third stage of the rust fungus.

The first, or red, stage is botanically named the "uredo" stage, and is popularly called by farmers the rust. The second or black stage is botanically called the "puccinia" stage, and is popularly known as the mildew. The third and last stage is botanically termed the "pro-mycelium" stage; being too insignificant and hidden to attract popular attention, it has received no popular name. The spores which it produces, and which are very much smaller than either the red or the black ones, are called the pro-mycelium spores.

There are thus three well-marked stages in the growth of the rust fungus, namely—First, the uredo, or red rust stage; second, the peccinia, or mildew stage; and third, the pro-mycelium stage. So far, all observers and investigators are agreed. But in regard to the further development of the fungus, opinions are divided; some botanists holding that the pro-mycelium spores, which are produced during damp, warm, spring weather, and are wafted about in countless numbers not long before the rust begins to show itself on the wheat, alight on the young wheat plants, and, if the atmospheric conditions are favourable, germinate thereon, entering the wheat tissue through the stomata or breathing-spores on the skin of the plant, and give rise to the red, or uredo, stage. This is the recognised life-cycle of rust in Australia.

It is to be observed that wheat rust does not confine its attacks to wheat, for, according to authoritative evidence, it has been found on many kinds of oats, including the wild oat; on many kinds of barley; on rye; on many of the ordinary imported grasses; and on many of our native grasses.

From a practical point of view, it has been generally considered that the most important of the above rust stages is the rusting-spore stage, since by means of these spores the fungus is continued from season to season. These spores, under ordinary conditions, retain their vitality for many months, and it may be for two or three years. They are not readily destroyed, for, according to good authority, they retain their power of germination even after they have passed through the body of an animal, so that even if straw containing them be used as fodder, the manure resulting therefrom may be a ready means of spreading the disease. It will be obvious, therefore, that manure obtained by the use of such fodder should not be applied to land about to carry a wheat crop, or any other cereal or grass crop liable to the attacks of wheat rust.

The most satisfactory method of dealing with straw containing these spores is to burn it. All rust-affected straw, stubble, and tailings from threshing should, whenever practicable, be burnt. One would naturally infer that such a measure would result in lessening the ravages of the disease during the subsequent year, and this inference is supported by the experience of farmers who have put the matter to a trial. To make this method fully effectual, not only should the straw, stubble, and tailings of the wheat crop be burnt, but also all grasses growing around the wheat paddocks.

It will also be evident that, to have its full effect, the operation of burning should be carried on simultaneously through the whole of a rust-infested area, as otherwise the disease will be conveyed by the wind from the uncleaned farms on to the cleaned. In any case, these spores, having once got a lodgment in the soil, may be exceedingly difficult of extermination, since a fresh ploughing may bring up to the surface those that have been buried by a previous ploughing, or have been washed in by the rains.

Although by far the greater portion of the resting spores remain in the straw, it must not be lost sight of that many are dropped into the soil, and that also many of them—quite sufficient to ensure a plentiful perpetuation of the pest—may adhere as dust to the threshold grain. Especially will this be the case in grain obtained from wheat, the ears of which have been attacked by the mildew. Wheat so affected is often difficult to thresh clean, so that not only may spores be present amongst the grain simply as adhering dust, but also many of the pustule-bearing husks may remain unremoved from the seed. Hence, not only should the straw, stubble, and tailings be burnt on the soil, so as to destroy spores in straw and soil, but also the seed should be treated.

As a matter of practice, the seed is generally treated by farmers with bluestone or formalin for destroying smut and bunt spores, and it is likely that, by this treatment, the rust spores on the grain are also destroyed. Of course, the treatment of the seed alone must be expected to be quite useless except in conjunction with the treatment of the straw and the soil. In the same way, it is to be anticipated that the treatment of straw and soil will be ineffectual unless accompanied by treatment of the seed.

Most farmers are aware of the greater susceptibility of some wheats as compared with other wheats to the attacks of the fungus. Is wheat grown from seed of a rust-affected crop constitutionally liable to succumb to attacks of the pest? This is a question upon which every opposite opinions are held, both by practical wheat-growers and by those who study the subject from more general points of view. Many intelligent farmers state it as their experience that wheat raised from rust-shrivelled seed suffers less from the ravages of the pest in the succeeding season than crops raised from clean seed. Statements like these are made very positively, and cannot be ignored.

But, on the other hand, many cases are on record where special varieties of seed, obtained from wheats which have the reputation of being more or less rust-resisting, have been grown side by side with other wheat, sown at the same time of the year, and grown under the same conditions of soil and cultivation, the rust-resisting wheat being in such cases only slightly affected by the disease, while the other wheat has been not worth the reaping. The late Mr. W. Farrer was the originator of many good rust-resisting varieties of wheat suitable to Australian conditions, but so far no absolutely "rust-proof" variety has been created here.

Respecting so-called rust-resistant wheats, it must be noted, however, that in Queensland, a variety which resists the rust in Victoria or New South Wales, may prove of no value in this direction. Many such sases are on record, and they are all very instructive. They seem, without question, to establish the fact that some varieties of wheat inherit a greater susceptibility to the attacks of rust than others. They also indicate that those varieties which have a local reputation as being rust-resisting may, when grown in other localities, and under conditions less favourable to their most vigorous development, be very liable to the disease. Hence it becomes probable that the selection of rust-resisting varieties must be carried on in many localities so as to obtain wheats suitable to the various wheat-producing districts.

On the side of those farmers who favour the use of rust-shrivelled seed, it may, perhaps, be said that there is some possibility, judging from the analogy of diseases affecting animals, that the wheat that has been affected

by rust becomes protected for a longer or shorter period against its attacks. In other words, we may say that it has been inoculated against the disease. On the side of those, however, who discountenance the use of rust-shrivelled seed, it may very justly be urged that the susceptibility to the disease—even though it may perhaps be put off for a generation or more on the assumed hypothesis of protection—must recur again in full force after the operation of the protection has ceased; and it stands to reason that in the long run the advantage must lie with the wheat which possesses a constitutional tendency to resist the attacks of the parasite.

It seems also very reasonable to suppose that, by the constant selection from rust-resisting varieties, even though the progress be a somewhat irregular one, and chequered at times by failures, the ultimate outcome must be the obtaining of varieties possessing a very much increased capacity of resistance. To those who view the question broadly, and from all points of view, the balance of evidence will be found strongly preponderating on the side of the use of clean seed obtained from known rust-resisting varieties. On a question, however, such as this, regarding which strong opinions are held on both sides, the only admissible appeal is to facts. The matter must be submitted to the test of exhaustive experiment, the experiments being planned and carried out with all the precautions which the practical experimenter understands how to provide for; and the results gained therefrom must be sifted by the criticism of the experienced critic.

Since the wheat rust spores, like all fungus spores, require for their germination moisture and warmth, and since for their entrance into the interior of the host plant they need to lodge on the plant and be left for a time undisturbed, it will be readily understood why a warm, moist, still day is favourable to the spread of rust. In all damp sheltered spots rust is prone to develop. Thus, in swampy ground, or where there is bad drainage, or in hollows and valleys, and in all localities during alternations of rain and hot sun, the rust spores find congenial conditions. It may be that under these conditions, specifics, if they could be economically applied, would be of use, but the application of specifics during this period may not perhaps be regarded as very hopeful.

The surest method is, by means of early sowing, to have the wheat plant so far advanced, and their tissues so hardened, that they may suffer less should they be attacked by the fungus. Evidence as to the benefit of early sowing is very general, and may be obtained from many sources. It may be observed that if the rust attacks the wheat late in the season, so great damage is not to be anticipated as when the attack takes place earlier. Possibly in late-attacked wheat the parasite will affect the leaves chiefly, and if the wheat be left standing a fair crop of grain may still be obtained. It may, therefore, be left to the discretion of the wheat-grower in such cases, as to whether he will cut for hay on the first appearance of the rust, or take the chance of a fair grain harvest.

It may not be inadvisable to emphasise the fact that all plants are liable to diseases resulting from the attacks of parasite germs; and that farm sanitation applies as much to the crops which grow in the field as it does to the live stock and to the homestead of the farmer himself. All those principles of sanitation—cleanliness, disinfection, either by burning or otherwise, drainage, the maintaining of the vigour of the organism by suitable nourishment, by selection from good stock, and by judicious cross-breeding—which have been found so successful when applied to animals, are, with suitable modifications, applicable to plants grown in the field, the orchard, and the garden. And it is from the gradual introduction and careful application of such principles that more general success is to be expected than from the use of specific measures in particular diseases.

In conclusion, we may state that the three principal measures to be adopted by our farmers with a view to minimising the ravages of rust in wheat: The selection of seed from rust-resisting varieties locally grown; the destruction of all infected straw; early sowing. These are the measures which all experience, when broadly viewed, indicates, whether the experience be that gained by the practical farmer or by the agricultural expert.

NITROGEN AS A FERTILISER.

This important element is essential to plant life, and, while it is abundant in the elementary form, it is, nevertheless, the most costly material which enters into the composition of commercial fertilisers. The high cost is due to the fact that ordinary plants can utilise nitrogen, only when it is in combination with other elements, and there is no economical process known by which the nitrogen of the air can be combined directly with other elements. Fortunately we have the means of obtaining nitrogen, by an indirect method, from the atmosphere, of which, this element constitutes about 78 per cent. This may be accomplished through the agency of bacteria. These are found in the soil, and under proper conditions multiply with amazing rapidity. They develop only on the roots of leguminous plants, such as clover, cowpea, vetch, velvet bean, &c. Here they make use of the nitrogen of the air, absorbed by the soil, and convert it into compounds which are taken up by the plant. On the roots of the plants are produced nodules that are frequently very numerous and variable in size. This method of restoring nitrogen to our soils is becoming more generally appreciated as it furnishes this element at the least possible cost.

The effect of nitrogen on a plant is very marked. It promotes a rapid growth of leaf and stem, and tends to produce a large, green, succulent plant. While a plant is in this condition, with a large supply of available nitrogen present in the soil, the formation of buds and flowers is retarded, and the flowers are not only diminished in numbers but many of them are rendered sterile, so that they produce no seed. A plant which grows up with an abundant supply of nitrogen is also less capable of withstanding a drought, and begins to burn when the moisture supply becomes limited.

Nitrogen does not merely act as a stimulating agent to the plant but enters into composition with the plant, forming albuminoid and other nitrogenous compounds. Plants grown on a soil well supplied with nitrogen are much richer in the above compounds than those grown on poor soil.

It is highly probable that nitrogen must be in the form of a nitrate before a plant can make use of it. In the soil there are a great variety of micro-organisms, and some of these have the power of converting various substances, containing nitrogen, into nitrates, so that most nitrogenous compounds when applied to the soil are acted upon by these bacteria, and, through this vital agency, are converted into nitrates. For the nitrogen of fertilisers we are dependent upon sodium nitrate, sulphate of ammonia, or various organic compounds, such as blood, bone, cotton seed meal, tankage, fish scrap, &c. It will now appear that the source from which the nitrogen of a fertiliser is derived is a matter of great importance. If nitrate of soda is used all the nitrogen is immediately available. If sulphate of ammonia is used it may become rapidly available on certain soils, slowly available on others, and on still others it may exist in an unavailable form so long as to be useless to the crop for which it was applied. In the case of the organic substances we find the nitrogen of some much more readily converted into nitrates than that of others. Much depends upon the nature of the soil and

on the kind of bacteria present. We are just beginning to appreciate the importance of the action of these bacteria, and we may expect far-reaching results from investigations along this line.—H. K. Miller, in "Press Bulletin" 22.

USEFUL NOTES FOR SETTLERS ON THE LAND.

Cost of Excavating a Tank.

Wages being reckoned at 1s. per hour.

1. Sand or loose soil—shovel work getting and throwing out per cubic yard	6d.
2. Hard soil—shovel work getting and throwing out per cubic yard	9d.
3. Wet mud or silt—shovel work getting and throwing out per cubic yard	10d.
If filled into drays and not more than 6 ft. deep add to the above	6d.
If filled into drays and not more than 6 to 12 ft. deep add to the above	10d.
If filled into drays and not more than 12 to 18 ft. deep add to the above	1s. 2d.
Clay soil, shovel work getting and throwing out, per cubic yard	1s.
Rock—blasting and excavating	2s. 6d.

Cost of Well-sinking.

1. Excavation in light soil, not more than 20 ft. deep, per cubic yard	2s. 3d.
2. Excavation in stiff clay or hard gravel, not more than 20 ft. deep, per cubic yard	3s. 6d.
3. Excavation in Sandstone or hard rock, not more than 20 ft. deep, per cubic yard	9s. to 15s.

From 20 to 40 ft. deep, add $\frac{1}{3}$ to the above.
,, 40 ,, 70 ,, $\frac{2}{3}$,,
,, 70 ,, 100 ,, double the first item.

Cost of an Overshot Dam.

If of concrete, and if materials are easily obtained, per cubic yard	50s.
If of masonry, rough rubble work, per cubic yard	30s.
All depending on the height and width of the dam.	
Earthwork and timber dams can be constructed for, per cubic yard	10s.

Cost per Mile of a Cattle-proof Wire Fence.

	£	s.	d.
Five plain wires and one barbed wire. Height of fence, 4 ft. with droppers; 20 ft. apart, and steel posts	£41	0	0
Cost per rod of two-rail wood fence	0	16	0
,, ,, three-rail ,, ...	0	18	0

Rabbit-proof Fence.

	£	s.	d.
Inch mesh 4 ft. high, in rolls of 50 yards—per roll ...	£1	3	0

Labour, posts, and straining wire to be added.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF NOVEMBER, 1909.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Cocoa ...	Jersey	12 Sept., 1909	900	4·4	44·46	
Whitefoot ...	Holstein-Devon ...	2 Oct. ,,	980	4·0	43·80	
Peewee ...	Holstein-Shorth'n	29 Aug. ,,	867	4·1	39·77	
Lady Kelso	Shorthorn... ...	2 Oct. ,,	937	3·7	38·56	
Careless ...	Jersey	27 Sept. ,,	830	4·1	38·07	
Redrose ...	Shorthorn ...	21 Sept. ,,	748	4·0	33·42	First calf
Chocolate ...	,, ...	15 June ,,	746	4·0	33·33	
Lark ...	Ayrshire ...	14 Aug. ,,	789	3·7	32·48	
Bliss ...	Jersey	5 Oct. ,,	658	4·3	31·73	
Lass ...	Ayrshire	15 June ,,	707	4·0	31·60	
Auntie ...	,, ...	23 Aug. ,,	789	3·6	31·56	
Ethel ...	Holstein	8 Oct. ,,	804	3·5	31·20	
Honeycombe	Shorthorn	11 April ,,	662	4·1	30·36	
Reamie ...	Ayrshire	7 July ,,	599	3·7	29·87	
Restive ...	Shorthorn ...	30 Oct. ,,	759	3·5	29·45	
Grace ...	,, ...	17 Aug. ,,	713	3·7	29·33	
Eve ...	Jersey	1 Nov. ,,	654	4·0	29·22	
Hettie ...	Grade Guernsey...	17 Sept. ,,	689	3·8	29·17	
Dot ...	Shorthorn... ...	1 Nov. ,,	771	3·4	29·01	
Cuckoo ...	Jersey	24 July ,,	612	4·2	28·79	
Stranger ...	Grade Shorthorn	12 Oct. ,,	694	3·7	28·56	
Night ...	Grade Holstein ...	23 Sept. ,,	690	3·7	28·40	
Tiny ...	Jersey	15 Sept. ,,	608	4·1	27·88	
Len ...	Ayrshire	6 Oct. ,,	692	3·6	27·68	
Winnie ...	Shorthorn... ...	2 June ,,	669	3·7	27·54	
Burton's Lass	,, ...	14 Sept. ,,	683	3·6	27·32	First calf
Md. Melba...	Holstein	8 Sept. ,,	682	3·6	27·28	First calf
Remit ...	,, ...	4 Aug. ,,	701	3·5	27·20	
Linda ...	Ayrshire	11 April ,,	586	4·1	26·88	
Mona ...	Grade Holstein ...	13 July ,,	526	3·7	26·86	

Grazed on old cultivation paddocks and natural pasture.

The above returns are remarkably good, thirty cows averaging 31·36 lb. of commercial butter. The season right through has been bad, and grass scarce.

ANGORA GOAT BREEDING.

The quickest way to start a flock of Angoras so as eventually to get the best quality of mohair, is, if expense is no object, to get the purest bucks and does from the Southern States.

A fair number of does to one buck is seventy.

A really well-grown good buck, put to well-grown does, his own progeny, would stamp his own individuality very strongly, and would probably not injure the constitution of the second cross kids, but putting him to them might be inbreeding too much. Some of our Angora breeders would, however, be now in a position to decide this matter.

A pure Angora buck could be allowed to run a lifetime with common nannies, but with the restriction above stated. A pure buck becomes unprofitable in about ten or twelve years, but the experience of Queensland breeders is not yet sufficient to lay this age down as a fixed rule.

Scrub ticks will kill Angoras if not picked off. If the kids appear dozy and are unable or unwilling to follow the flock, ticks should be suspected and searched for. They do not carry cattle ticks. Dingoes and eagle-hawks are very destructive, and heavy poisoning is the only remedy if goats are allowed to run at large without shepherding.

The best market is Saltaire, a suburb of Bradford, England.

ANGORAS AS FARM HANDS.

Mr. Geo. B. Ellis, of Columbia, Missouri, secretary of the State Board of Agriculture, says that Angora goats as farm hands are a success, and his statement is backed by facts and figures. Experiments in clearing farm lands of weeds and shrubbery by goat grazing have been conducted in many sections of Missouri during the last twelve months, and from reports of results received here it is evident that much expense can be saved by utilising these animals as farm labourers. Farmers and agricultural authorities are giving this question very serious consideration at present, and the experiments will be continued on a much larger scale. It has been clearly demonstrated that goats, when pastured on lands overrun with weeds and shrubbery, will consume the obnoxious growth, eating to the roots, and suffer no ill-effects therefrom. The experiments have proved that goats of the Angora breed do the best work. The ground on which the goats are pastured should be surrounded by a high wire fence. This is about the only expense involved aside from the cost of the herd. They require no attention while at work.

The Horse.

WHY DOES A HORSE STUMBLE?

Replying to this question by a correspondent, "Farm and Home" says:—

You propound a most interesting question, but one that it will be difficult to answer, or do more than suggest possible causes, which may or may not account for any particular case. The subject is one that has puzzled many an experienced veterinary surgeon and practical horseman, and in the absence of all those defects enumerated, and which might reasonably be held to account for horses falling, the actual cause remains a mystery. You say, "doubtless you have met some like it." We have, and we once saw a well-bred and stylish-looking cob, whose behaviour so nearly resembled that of the animal you describe that they might be the same horse. In this cob there appeared to be absolutely no defect in conformation, style of going, or unsoundness. He would fall down anywhere, but rarely in going down hill. He would do so in harness or at saddle, when going at a walk or slow trot, and then for weeks would be quite safe. In this connection the heading to your query, "Why do horses stumble?" seems hardly appropriate. All sorts of theories were formed to account for this cob falling—including carelessness and temporary loss of consciousness, but eventually a tumour was developed in the lower part of the shoulder, and it was decided that the sudden falls were due to pain caused by that.

We have also met with cases where the most decrepid of old crocks, driven in the most careless fashion by inexperienced lads, and at a rattling pace, never came to grief, and we can no more account for the one than the other. We believe, however, that the majority of those cases, where horses do not stumble, but fall suddenly, and concerning whose conformation or soundness no fault is palpably apparent, are due either to vertiginous seizures of brief and passing character, to "speedy cut," or the striking of the splint bone with the shoe of the opposite foot, or to crossing the legs in action.

Plate I.

The Flannel Flower.

Poultry.

GREEN FOOD FOR FOWLS.

When fowls are kept in wire runs the importance of green food to maintain them in health, and consequently in full lay, should not be forgotten. Though the run be of grass, some additional green stuff and vegetables are much appreciated by them, and repaid in additional eggs. An experiment made at an American farm recently to test the difference in the egg return when fowls had green food given them and when deprived of it gave the following result:—Two lots of twenty fowls were placed in runs of equal size and fed on the same ration of food, chiefly mixed grain; the runs in each case provided a little grass for them, but in addition to the ordinary food one lot were freely supplied with freshly chopped cabbage, rape, and apples for a period of thirty days. At the expiration of this period they went thirty days without the green stuff and apples, which meanwhile were given to the other lot. This went on for a year, at the end of which time each lot had been six months with and six months without the green food While receiving the green food the fowls laid 114 eggs each; while deprived of it, 90. The difference is sufficiently marked to show the value of the green food. Probably had both lots had it continually the average of 114 would have been largely exceeded. The fowls were about five years old, which accounts for the small total.

When there are no garden greens to spare for the poultry, roots cut in two and thrown into the run will serve; the fowls will peck out turnips and swedes till only the shell remains. When trimming grass edges the rubbish should be emptied into the run. Sods of fresh turf are better than nothing, affording fresh green and giving the fowls occupation scratching, for the grass in the run is speedily eaten down or grows luxuriously in patches which the fowls will not touch; but the best additional greens are fresh cabbages, lettuces, and the like, and should be grown on purpose for them.

Horticulture.

THE FLANNEL FLOWER.

A correspondent asks us to give an illustration of the "Flannel Flower." Some time ago a correspondent of "Country Life" sent the photograph here reproduced to that journal. He said, in connection with it:—

The Australian flora is exceedingly rich and diversified, many of the most beautiful flowers being unknown in Europe or America, although common in many parts of the island continent. Among these is the flannel flower, also known by the inappropriate name of Australian edelweiss. The term "flannel flower" may appear unpoetical, but it is really descriptive, the flower looking as if it were snipped out of white flannel. It grows from 1 to 2 ft. in height, and is exceedingly abundant in New South Wales, many thousands being annually sold by the Sydney wild-flower dealers. Attempts have been unsuccessfully made to cultivate it as a garden flower, the difficulty being the impossibility of propagating it in made soil.

The Orchard.

FRUIT AND VEGETABLE GROWING IN THE BOWEN DISTRICT.

By ALBERT H. BENSON, M.R.A.C.

Some eight years ago I wrote an article on fruit-growing in the Bowen district for the "Queensland Agricultural Journal," wherein I stated that "the general expression that I formed of the fruit-growing capabilities of the Bowen district was a very high one, as, with the good soil, the abundance of available water, and a suitable climate, I could see no reason why the industry should not be considerably extended"; and, further: "Bowen has the three great essentials for fruit production—suitable soil, water, and climate; and, if these are used intellectually, I see no reason why the industry should not become a very profitable one."

That I was right in my estimate has already been proved, as shown by the marked increase in the exports of fruit and vegetables from Bowen, which have risen from 17,015 packages for the year ended 30th June, 1901, to 105,489 packages for the year ended 30th June, 1909; and 70,396 packages have been exported for the first four months of the year 1909-1910.

The present exports, though they have reached a respectable total, are only a fraction of what the district is capable of producing, as the fruit and vegetable industries of the district are practically only in their infancy, as shown by the total area under general crops, which includes orchards, but not sugar-cane, and only amounts to a little over 1,200 acres. There has been a steady yearly increase in production with the exception of 1903 and 1908, when the output was less than either the succeeding or preceding years, and the district has certainly gone steadily ahead since 1901. There is a decided improvement in the methods of culture now in vogue to those of a few years since, and the magnificent asset that the district possesses in the practically inexhaustible supply of good underground water is being more fully appreciated, but not to anything like the extent that it will be some day.

According to the annual report of the Bowen Chamber of Commerce for June, 1909, there are some forty-eight irrigation plants in use, and a total of 356 acres are watered thereby.

Thse plants are, as a rule, small, but many are quite up to date, benzine or kerosene motors of modern types being used in conjunction with centrifugal pumps.

These are usually only of low power, the average flow of water for the most up-to-date plants being some 8,000 gallons of water per hour, which is found to be about as much as an individual grower can handle to advantage.

There is still a considerable area of excellent land awaiting settlement, and I was glad to note that two of the largest freehold properties on the Don River, close to Bowen, that have been tied up for many years, have been sold, and cut up into blocks of convenient size for orchards or vegetable gardens. Much of the land on these two estates is well adapted for this purpose, as the soil varies from a deep sharp sandy loam that will grow good pines, citrus fruits, &c., to heavier loamy soils that, with irrigation combined with deep and systematic cultivation, will grow all kinds of vegetables suited to the district—corn, pumpkins, sweet and English potatoes, mangolds, sorghum, in fact any crop that is suited to the climate. Lucerne has not been grown to any extent in the district, but I feel sure that if planted about May on the deep free loams adjacent to the Don River, and irrigated when

necessary, that it will do well, as the climate is neither as hot nor as dry as that of the central valley of California, U.S.A., which grows lucerne to perfection with irrigation.

Another large estate further down the river is also being cut up into small blocks, and let on lease, so that there is now a quantity of land in the district that is available for settlement, and which, once it is brought under systematic and intensive culture, will yield such returns that the exports of Bowen will increase at an even more rapid rate in the future than they have done in the past.

The success of vegetable and fruit growing in the Bowen district depends mainly on the judicious use of water for irrigation, combined with deep and systematic cultivation. Much of the land is so rich in plant foods that for some years, at any rate, little if any manure is required, in fact, in the case of a series of manurial experiments for cucumbers, the application of artificial fertilisers seemed to have a decidedly injurious effect, as the soil gave decidedly better returns when unmanured than when manured. Where, however, the soil has become depleted of its available plant foods then manuring will be necessary, and, in my opinion, the cheapest way to supply such plant foods will be to manure the land with a combined potash and phosphatic manure; plant same to a leguminous crop, such as cowpeas, Mauritius or haricot beans, and either plough the crop under when in blossom or cut it, and allow it to remain on the ground and rot. The fruits that are grown to the greatest perfection in Bowen are the Round Orange, Emperor Mandarin, mango, and pineapple, though, in addition to these, fruits such as the cocoanut, banana, passion fruit, granadilla, papaw, lime, lemon, and other citrus fruits. Sweet sop, sour sop, cherimoyer, tamarind, and several others of minor importance are grown in smaller quantities throughout the district. In vegetables, the two commercial sorts are tomatoes and cucumbers. These the district produces at a time of the year that they cannot be grown in the Southern States ; hence Bowen is able to supply the markets of the Southern States when they are bare of these vegetables, and, consequently, to secure a satisfactory return for same.

In addition to the growing of cucumbers and tomatoes, excellent pumpkins, marrows, melons, cabbages, English and sweet potatoes, &c., are grown. Pumpkins planted in the autumn and held over to spring are often a paying crop, as they can be sent to the Southern markets when their local supply is done, and before the new crop is ready. In fact, Bowen is in a somewhat similar position as regards the Southern market to that of the Mediterranean littoral as regards the London and English market generally—viz., in being able to supply fruits and vegetables in their off-season, and at a time that they will realise the highest price. Given a regular service of steamers to the Southern ports, such steamers to be fitted with well-ventilated and cool, not chilled, holds, there is no reason why the exports from Bowen should not be greatly increased, as not only can the Southern markets be supplied with vegetables of several kinds in their off-setson, but fruits, such as mangoes and others of a tropical nature, can be sent down in good order, and at such a stage of ripeness that they will ripen up a good colour and flavour when they reach their destination, instead of having to be gathered so immature, in order to carry, that they never ripen up properly and never develop their proper flavour.

Bowen, in my opinion, is a good place in which to start fruit and vegetable growing, as, with the advantages that the district possesses in its rich soil, good water supply, splendid harbour, and the fact that it is able to grow such a number of different fruits and vegetables, and to ship them to the Southern markets, where there is a steady and increasing demand for same, there should be a good opening for energetic, hardworking men who will cultivate a little land and cultivate it well. Too large an area of land in

this district is a great mistake, as the growing of fruit and vegetables successfully is a question of intensive culture combined with judicious irrigation, and to do this properly one can only handle a small area of land. A small area of land treated in this manner will yield a handsome return, when a large area neglected will result in loss to the owner, and be a bad advertisement for the district.

FRUIT-PRESERVING FOR FARMERS.

Frequent inquiries are received by the editor respecting the best methods of preserving fruit, especially peaches, apricots, and strawberries. Amongst the best papers on this subject is one which was lately published in "The Agricultural Journal of the Cape of Good Hope," written by Mr. Wm. Jacques, Canning Expert to the New Zealand Department of Agriculture. Although written in 1907, the instruction therein given is good for 1909:—

The condition in which the fruit should be for bottling depends upon the use for which it is intended: If it is to be treated for dessert purposes it should be mature but not soft; if for pie-fruits or for stewing it should be quite on the hard side. Over-ripe or damaged fruit should be converted into jam or made into pulp for making jam when the fruit-packing season is over. Specked and bruised fruit should not be used unless the bruised parts and the surrounding flesh can be cut away. In selecting the fruits, while it is quite true that any variety can be used, for pie-fruits the cooking varieties give by far the better result; while for dessert fruits, if it is desired to turn out a fine and satisfactory article, there are certain varieties that are so far superior to others that it will be much more satisfactory to select these rather than expend time and money in treating varieties that do not give entirely satisfactory results. At the same time, if a quantity of fruit is available for preserving, there is no reason whatever why it should not be put up for personal or local supply; but if it is proposed to turn the business to commercial account it is most desirable to obtain fruit which is orthodox as to colour, flavour, and appearance, and suitable for the purpose.

Apricots.—These should be selected, developing flavour and sweetness at an early stage of ripening, as well as a good colour. The fruit should not be too large, but of fair size, evenly graded and clean.

Pears.—The fruit should not be too large, but of good size, evenly graded, and clean.

Peaches.—Any good-flavoured, firm-fleshed fruit will bottle, but deep-yellow or pure white give the best result. Clingstone fruit has the better flesh, but it is somewhat troublesome to prepare unless a pitting-spoon is available to remove the stone; while freestone fruit may be used, provided that the pit is not too large and the pit-pod is free from fibre, light in colour, and easily cut away, otherwise the fibre may separate from the fruit and cause the syrup to become cloudy or coloured, and otherwise spoil the general appearance of the package. The fruit should not be too large, but medium in size, and well graded. Late peaches are better than the early varieties.

Raspberries should be large and well coloured, but not soft, and as fresh as possible.

Strawberries.—These should be of a sort specially grown for preserving, and unless these can be obtained a really satisfactory result cannot be expected. They should be small, round, and a good colour.

Cherries.—Dessert fruits should be large and always pale in colour, though local taste may prefer the dark varieties; but in either case those put up for dessert should be large and carefully selected, the small being put up as pie-fruits. In no case should bruised or damaged fruit be used. Any kind of cherry may be bottled.

Quinces may be bottled. There is little demand commercially, which I attribute to a want of appreciation of a very wholesome, useful, and delicious pie-fruit. Any variety may be used, but choose the best available.

Apples.—The most valuable and obliging of all fruits if properly treated. Apples are sometimes thought too common to preserve in bottles; this may be true from a commercial point of view, but not in the domestic sense, because with care the bottle and cover may be used each season, and the apples are kept for winter use at the expense of only the ring. It is not desirable to put up apples for dessert purposes. Sweet dessert apples do not bottle so well as cooking apples; and, while almost any variety may be used, be careful to choose, if possible, a hard, sour cooking sort, with firm white flesh and a small core.

To Prepare the Fruit.

Never pack two varieties of the same sort of fruit in the same bottle (red currants and raspberries excepted), and always thoroughly sterilise the bottles, covers, and rings before using. Spread the fruit out on a table or bench, which should be fitted with a ledge to prevent the fruit from rolling off. The table should be covered with cocoanut matting to make a soft surface, as it is essential not to bruise the fruit. Pick out all specked, bruised, and damaged fruit, and grade the sound fruits into two or three sizes. If the fruit is wet or dirty, it should be washed in salt and water, taken out, and drained. Then proceed as follows:—

Apricots.—As apricots are packed with their skins on, any specked fruit will spoil the appearance for dessert, therefore reject all imperfect fruit for this purpose. With a clean, sharp knife cut evenly round the stone, commencing at the stalk end, then take the fruit in both hands, and with a firm but decided twist, without bruising, divide the fruit into two halves, and with a small spoon sharpened at the edges, or, for preference, a pitting-spoon, cut out the stone cleanly; remove the stalk and any loose pieces resulting from an uneven cut, and pack immediately into bottles which have been previously sterilised, placing the pieces, skin uppermost, slightly overlapping one another. If carefully packed, the bottles will hold more fruit and have an attractive appearance when finished. Be careful not to press the fruit down, or it will be bruised. Fill the bottle quite full, place your hand over the top, and strike the bottom of the bottle on a wooden table to shake the fruit down, and fill up with fruit till the bottle will hold no more. Then fill up with syrup to the top—a dense syrup for dessert fruits and a light syrup for pie-fruits. Pie-fruits are treated in the same way.

Pears.—Pears should have their skin removed before they are packed. Pick them over carefully, removing all bruised and damaged fruit. Grade them for size. Pare the fruit lengthwise, with a sharp knife with a thin blade, so as not to bruise the fruit, or, if a large quantity is to be prepared, have ready a wire basket or string net, place the pears in this, and dip them for about three or four minutes into a boiling solution of caustic soda and water—6 oz. of caustic soda to each gallon of water; take them out and immediately immerse them in a tub of clean cold water, being careful not to bruise them. The skin may then be easily removed. But I recommend peeling by hand as most satisfactory.

If the bottles are not ready, the pears should be put into a brine dense enough to just float a potato. This will prevent the fruit from oxidising, which it is likely to do if exposed to the air. It is not necessary to wash the fruit after brining, but allow it to drain. The small quantity of brine will not affect the flavour.

When the bottles are ready, cut the pears in halves for dessert and quarters for pie-fruit, remove the core with a pitting-spoon, a sharpened spoon, or wire-cutter; also remove the stalk and all loose pieces, and pack

carefully into the bottles, outer side uppermost, filling with syrup of medium density for dessert pears, and light density for pie-fruit (see "Syrup"). The bottled pears must be turned about before preserving, to enable the air to escape from the cavity caused by cutting away the core.

Peaches.—Grade peaches for size and variety, rejecting damaged fruit.

The fruit should be pared by hand. Some prefer to remove the peel first, while others prefer to remove the pit and halve the fruit, peeling each half separately. The latter process gives the better result, and is employed in the best canneries in California and Europe. Much depends upon the fruit to be handled; both ways should be tried. Remember that much handling after the skin is removed will materially damage the appearance of the fruit.

To remove the pit, procure a pitting-spoon made for the purpose; insert this close to the pit at the stalk end and cut it away cleanly from the flesh all round, keeping the spoon close to the stone. It is then quite easy to cut round the stone and divide the fruit into halves.

The fruit is packed flat side downwards, partly overlapping (as recommended for apricots), and the bottles filled up with syrup—heavy for dessert and light for pie-fruit.

Freestone peaches are pared first, cut round the stone, halved, and the pit removed; the fibre in the pit-pod should be cut away so as to leave a clean-cut surface of fruit. All loose pieces are removed, and the fruit packed into bottles, as above.

When a very large quantity is to be prepared, the skins may be removed by scalding in solution for about two minutes and plunging into cold, clean water as described in preparing pears, but I do not recommend this method. It is not employed even in factories, as it is very liable to spoil both the flavour and the appearance of the fruit.

Pie-fruits are sometimes packed whole, but this is not recommended, as the bottles do not hold enough fruit when packed in this way.

Plums.—Only the best varieties of plums should be bottled. I do not consider the Japanese varieties or inferior-grown plums worth even the small amount of labour and expense. The Japanese plums do not develop flavour and quality until they are quite ripe. Then they are good enough to eat; but their condition renders them unsuitable for bottling, with a few exceptions.

Pick out all damaged, specked, and over or under ripe fruit; grade for size, wipe carefully if wet or soiled, pack straight into the sterilised bottles, and fill with light syrup for dessert fruit and very light syrup for pie-fruit. If the stones are free from flesh, it is advisable to prick the fruit to the pit-pod to allow the air to escape during the process of preserving.

Raspberries and Strawberries.—Pick over the fruit, which should not be over-ripe: remove the stalks and leaves; pack at once into the bottles, and cover with a good, clear, medium syrup—if the syrup is too heavy it will give the fruit too much the appearance of a conserve. Raspberries are only packed as for dessert.

Strawberries may be treated in exactly the same manner as raspberries.

Cherries.—Clean the fruit, first picking out damaged and over-ripe fruit; remove stalks and leaves, and pierce the fruit down to the stone, or the stones may be removed by a cherry-stoner made for the purpose. Pack closely in sterilised bottles in a light syrup for dessert, and very light syrup for pie-fruit. The darker-skinned varieties may have a slightly heavier syrup.

Quinces.—Pick out badly bruised fruit; pare and core the fruit, and cut into evenly-sized wedges or thin slices; pack in sterilised bottles, and cover with a very light syrup. Quinces are usually packed for pie-fruit or stewing.

Apples.—These must be carefully selected if it is intended to produce a really good result. The varieties must not be mixed, or the appearance will be spoiled. Pare and core the fruit. This is best done with a machine.

Then cut the apples into quarters, according to the size of the apples—large into five, six, or more, medium into four or five, and small apples into four; or, better still, grade the apples, and cut those of each grade into an even number of wedges. Place the apple-pieces immediately into brine to prevent discoloration, allow a few minutes for the fruit to drain, and transfer into sterilised bottles, covering immediately with light syrup. It is desirable to have the apples as white in flesh as possible, and care should be taken to remove all bruises and blemishes.

THE SYRUP.

For the convenience of estimating the density of syrup we take the weight of a gallon of water at 10 lb.: thus, 1 lb. of sugar to 1 gallon of water, or 10 lb. of sugar to 10 gallons, which equals 100 lb. of water, gives us a syrup of 10 per cent. density; 2 lb. to the gallon gives 20 per cent. density, and so on. The syrups mentioned herein may be set forth as follows:—

Extra heavy ...	6 lb. to the gallon, or	60	per cent. density
Heavy	4 lb. ,,	40	,,
Medium	3 lb. ,,	30	,,
Light	2 lb. ,,	20	,,
Very light ...	1 lb. ,,	10	,,

The value of sugars and the weight of water vary somewhat: it is therefore advisable to use a small instrument, costing about 3s. 6d., called a saccharometer, for the purpose of testing the density of syrup, for while some may prefer highly sweetened syrups, others may condemn these as sickly; and, as the strength of the syrup does not materially matter, the preserver should exercise his (or her) discretion, and use a saccharometer as a guide and to ensure a regular strength in each batch of fruit.

Take rather more water than may be required—this will be a matter of judgment, the quantity varying according to the space between the fruit; bring it to the boil, and stir in the required quantity of sugar, and simmer steadily for about seven minutes, stirring occasionally, and removing any scum that may arise to the surface. The longer the syrup is worked in this way the denser it will become. Care must be taken not to let it scorch or burn, or the colour and flavour as well as the "texture" will be spoiled. When finished, strain through a piece of muslin into wooden or earthenware vessels, and allow the syrup to cool before filling it into the bottles.

The syrup must be used the same day that it is prepared. If any is left over to the next day it must be again sterilised before it is filled into the bottles; it may be added to the fresh batch of syrup with the sugar.

For canning fruits for commercial purposes very heavy syrups are used for the highest-grade fruits. These are obtainable by evaporation, and sometimes a small spoonful of sugar is also added in the tin. A very small quantity of the finest glucose is also sometimes used, but these methods are not necessary in household preserving.

Sometimes honey is used with the syrup in preserving strawberries, raspberries, and other choice dessert fruits. This is a very good practice. The bee-hives are placed among the fruits for which the honey is intended to be used, in order to obtain an additional flavour. I have tasted fruits treated this way, but considered them too rich and sweet to allow me to eat enough of them. Certainly they were very luscious, but for ordinary purposes I consider a good syrup properly made is sufficient.

THE PRINCIPLE OF PRESERVING.

Several things have to be carefully remembered to enable the preserver to arrive at a successful result. First, the fresh fruit no sooner arrives at a state of perfection than it begins to decay. Then, the more quickly the fruit

ripens the more rapid the decay. Thus fresh fruit necessarily contains the germs of decomposition more or less emphasised according to the condition of the fruit. The principle of preserving is to arrest this decomposition by sterilisation, not of the fruit alone, but of the whole contents of the bottle, by driving out and absorbing all the air and gases, and preventing any air returning. Thus a vacuum is formed within the bottle or receptacle, and a corresponding atmospheric pressure on the outside, principally upon the cover, this being the part which offers the least resistance. It is not essential to destroy entirely the micro-organisms in the fruit, for if this were done scientifically the fruit itself would be effectually reduced to a mass of pulp by the lengthy and highly heated process; but in a properly procured vacuum (which Nature abhors) the germs become dormant and sterilised, and in the absence of air cannot continue the natural process of decay. The fruit therefore remains in its natural condition of freshness as long as the vacuum is effectively maintained, or until the bottle is opened and the vacuum, of course, destroyed, when, in the natural evolution of things, the germ-activity will go on again as from the time when it was arrested by the process of preserving, but at a slightly increased rate resulting from the unnatural check to which it has been subjected.

STERILISING THE BOTTLES, &c.

The bottles and covers should be well washed, and thoroughly dried in an oven until they are quite hot. This will effectually sterilise them. It is also desirable to fill the fruit into the bottles as soon after as possible.

Sometimes it is desired to sterilise a large jar when putting up jam or pickles in large quantities. This may be done by procuring a sulphur taper and attaching this to a wire; allow it to burn in the jar (which should be quite dry) for a few seconds. This will have the desired effect, and this method may also be used for sterilising barrels, which must, of course, be previously cleansed and dried. This sterilising must be done just before use, and will not injure the flavour of the goods.

THE PROCESS OF PRESERVING FRUIT IN GLASS BOTTLES.

Having described the principles of preserving, I will now proceed to describe the process by which a proper vacuum may be secured and maintained in bottled fruits. I am aware that a vacuum chamber is sometimes used for certain preserves and confectionery, but this is not satisfactory in preserving fruits. The method in general use, and which supersedes all others for fruits, is the application of heat, which may be either live steam or hot water. Live steam has many disadvantages, and is not suitable for household use, nor is it now employed in preserving fruit commercially. Water is by far the best method, and is the only means now employed in preserving fruits in bottles. Water can be brought to a higher temperature by the addition of certain chemicals, but this need not be discussed here, as I do not find it necessary to employ water at boiling-point or over. It will be well, however, to offer a word of warning against the use of sea-water. A case came under my notice where, fresh water being scarce, sea-water was used for the preserving-bath, and, although the preserver had been usually successful in the past, he was surprised on this occasion to find his fruit over-preserved, in consequence of the sea-water, which, being of greater density, reached a higher temperature than he intended.

The utensil to be employed may be the ordinary domestic boiler (or copper), or a suitable preserving-bath may be made at small cost, having a tray made to fit the inside closely, and deep enough to allow the water to completely cover the tops of the bottles to a depth of one or two inches. The tray should be made of strap iron and galvanised, light in weight consistent with strength, and fitted with rope handles (not metal) to enable the operator

to lift the tray containing the bottles bodily out of the bath. Several baths of this description can be employed if necessary, or a larger bath to hold two, three, or four trays can be employed according to the quantity of fruit to be preserved. If the copper boiler is to be employed as a preserving-bath, as is usually the case, I strongly recommend the use of a galvanised wire basket, made to fit the inside of the boiler. This will enable the preserver to submerge all the bottles of fruit in one operation, and, what is more important, to lift them all out at one time, and so avoid the trouble and annoyance which generally occurs with that last bottle which "declines to come out" when a wire basket is not used.

The cost of the few appliances which I urge all fruit-preservers to provide themselves with is so trifling, and, seeing that they will pay for themselves the first year in the improved quality and extra quantity of finished bottles, that they can be used for other purposes when not employed for fruit-preserving, and if taken care of will last for many years, the outlay can only be considered in the light of a good investment.

Those that are necessary and important are:—

(1) A suitable tray or basket.

(2) A bath-thermometer.

(3) A pitting-spoon.

In addition to the above, it is well to be provided with a sieve, a wooden tub, a wooden or enamelled bucket (large size), a saccharometer for testing syrup, and a paring-knife. A large stewpan and a wooden spoon are also sometimes required.

Put sufficient water to completely cover the bottles in the copper or bath (which for brevity will be hereinafter referred to as the "bath"), and set the fire going. Tie a piece of string to the loop of the thermometer, and suspend it in the water so that it may be easily read. While the water is heating see that the covers of the bottles are fitted correctly and quite loosely on the bottles, but not so loosely as to be liable to fall off in the bath; also see that the indiarubber rings fit correctly and are sufficiently soft and not perished by age. It is false economy to use old or previously used rings; if they are round in shape they must not have a twist in them. Pack the bottles then closely into the basket (or tray); it is not necessary to pack hay or straw between them, as they will not be likely to dance about and strike one another in the temperatures we are about to use, as they would when water is brought to boiling-point (212 deg. Fahr.) or over.

The bottles of fruit being now prepared and packed in the basket, watch the thermometer until the water reaches a temperature of 130 deg. Fahr., not more, and not less except in cold weather, which rarely prevails when fruit is to be preserved. Then take the basket and place it with the bottles into the bath, the bottles being entirely submerged one or two inches below the surface of the water. It may be imagined, the covers being loose, that either the syrup will get out and mix with the water or the water will get into the bottle and mix with the syrup; but neither will happen, as when the bottles are submerged in cold water (which I do not recommend, although it is an old-fashioned method sometimes employed). It may also be imagined that the bottles will break, but this is not at all probable if they are properly annealed as they should be. Also, it is often thought that the indiarubber rings may not withstand the heat if fitted into the bottles and subjected to the necessary heat in preserving. These are suitably carbonised for the purpose, and no fear need be entertained on this account.

Now, watch the temperature of the water continue to rise until it reaches 160 deg. Fahr., and at this point it is necessary to note the time carefully, and to count from this the number of minutes usually required for the preserving process. The action of the fire must be looked at and regulated, so that when the required heat is obtained it can be kept steady at this, instead

of getting much too hot or not hot enough. This may be done by regulating the quantity of fuel and by opening or closing the door or damper as may be necessary.

As previously stated, no hard-and-fast times and temperatures can be laid down; but the following table is as near as can be, if the fruit is of correct variety and condition, as recommended:—

Immerse the bottles at 130 deg. Fahr.

Count the time from 160 deg. Fahr., and preserve:—

Apricots	at 180°—185°	for 13 to 15	minutes,
Pears	„ 190°—195°	„ 15 to 20	„
Peaches	„ 190°—195°	„ 15 to 20	„
Plums	„ 185°—190°	„ 15 to 17	„
Raspberries	„ 175°—180°	„ 15	„
Strawberries	„ 175°—180°	„ 15	„
Gooseberries	„ 180°—185°	„ 13	„
Cherries	„ 195°—200°	„ 15 to 17	„
Quinces	„ 195°—200°	„ 15	„
Apples	„ 185°—190°	„ 12 to 15	„
Currants	„ 180°—185°	„ 10 to 15	„

As a practical guide the foregoing table will be found reliable, but it will be necessary in some cases to regulate the period and temperature according to the variety and condition of the fruit. For instance, there are many excellent apples which at 180 deg. will become pulp in eight or nine minutes; it is obvious that these are not suitable varieties for preserving. On the other hand, there are others which will require cooking for twenty to twenty-five minutes before they will be sufficiently cooked. Then, again, a variety grown rapidly in a warm climate will not require so much heat, but a longer time in preserving than the same variety grown more slowly under less forcing conditions. Therefore I recommend an experiment to be made with two or three bottles, so that the time and temperature suitable to the particular variety or condition of apple or other fruit to be preserved may be precisely determined. The many details which it is necessary to bring to the preserver's notice may appear very complicated, but there should not be the least discouragement on this account, for a very little practical experience will make all things quite plain and prove many times more instructive than volumes of theory. At the same time, the rule that the softer the condition of the fruit the less the heat and the longer the process will be a safe guide to success.

Having preserved the fruit according to instructions, lift the basket from the bath, and with some pieces of sacking made to fit the hands, take each bottle while hot and screw down the cover without any delay. Stand the bottles on a wooden floor or a piece of board (not on stone, cement, or damp earth), and cover them with a piece of sacking or cloth to protect them from a draught of cold air, which might cause the bottles to crack or break, and leave them thus until the next day. Then examine and test them, and if necessary give the covers a further screw-down (except when Mason jars or jars in which the rubber is likely to be disturbed are used). Clean the bottles, label them, wrap each in paper, which again label outside, and store in a cool place in an upright position. The paper wrapper prevents the action of light deteriorating the colour of the fruits.

The fruit when cooled and finished should be quite firm in the bottles, the syrup clear and of a creamy texture. If the fruit appears extra firm before it cools, this need not cause much concern, because the heat of the syrup will continue to act in cooking the fruit still more after it is removed from the preserving-bath. Before the bottle is finally cleaned and wrapped it will be advisable, if possible, to test each bottle. Where the tin cover is loose a sharp tap with a nail or knife-handle will give a crisp ringing sound, evidence of the

vacuum upon the bottle; but should the sound be dull and hollow it will be evidence that the air has not been properly exhausted, in which case there will be no vacuum, and it will be necessary to thoroughly inquire into the cause, rectifying the trouble, and to again preserve the bottle or to use the fruit at once, or pulp it, or convert it into jam. In preserving perform precisely the same process as in the bath, but for two-thirds of the time only, as in all probability the fruit may become pulpy, certainly too soft, but at the same time quite usable.

Another method of preserving fruits is to subject them to the process of preserving. This is an improvement on the simple method just described, and is usually adopted commercially, as the fruit will be more certain to keep sound for a longer period. A strong steel clip fits down closely to the cork during the process of preserving, and prevents the cork from being blown out of the bottle. The fruit is very lightly cooked and filled into hot bottles; the process of preserving is the same as regards times and temperatures as given in the table above. Then remove the bottles from the bath, and when cold remove the clips, cut the cork flush with the bottle, finish off with wire, and dip in the mixture of resin and beeswax as advised.

Many persons pack pie-fruits in water only. I do not recommend this practice, because the flavour of the fruit is much deteriorated, while the addition of 1 lb. of sugar to the gallon of water will make little difference in the cost, and will fix the flavour in the fruit and produce a distinctly improved package when compared with fruits packed in water only.

Some people use a small quantity of preservative, such as boric acid or salicylic acid, with these fruits, but I do not recommend this; in fact, it is quite unnecessary when fruits are properly preserved and all details are given intelligent attention. Preservatives are extremely useful when properly employed, but their use is often abused. The medical officers ought to insist on all preservative compounds bearing full instructions as to their use, and a warning against using too much. There is a difference between the use and abuse of a very useful article.

The bottles of fruit, when finished as advised, may be improved in appearance by the tops being covered with thin tinfoil, neatly folded over and rubbed down smoothly.

When storing these bottles it is sometimes advisable, especially when they are not corked by a machine, to lay them on their sides, so that the corks may be kept moist. These and all other bottled fruits should be wrapped to prevent the light spoiling the colour.

WHAT IRRIGATION DOES.

It reclaims arid wastes.
It makes a prosperous country.
It causes the desert to blossom.
It insures full crops each season.
It makes poultry raising inexpensive and particularly profitable.
It multiplies the productive capacity of the soil.
It destroys insects and worms and produces perfect fruits.
It creates wealth from water, sunshine, and soil.
It makes the farmer independent of rainfalls.
It yields surprisingly large returns to investors.
It makes possible the production of choicest fruits.
It gives arid lands great advantage over rainfall areas.
It will increase threefold the value of lands having rainfall.—"Poultry and Farm."

Botany.

CONTRIBUTIONS TO THE FLORA OF BRITISH NEW GUINEA.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

In a packet of specimens of British New Guinea plants lately received from Mrs. H. P. Schlencker, of Boku, the following interesting species occurred:—

Order BIXINEÆ.

Cochlospermum Gillivræi, *Benth.* *See* Ql. Fl., page 65, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order STERCULIACEÆ.

Abroma fastuosa, *R. Br.* *See* Ql. Fl., page 146, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order RUTACEÆ.

EVODIA, Forst.

E. microsperma, *Bail., sp. nov.* Papuan name, Nebara. Tree about 20 ft. high. Branches prominently 4 or approaching 3-angular, except the very young growth quite glabrous. Leaves trifoliolate, petioles slender, 3 to 4 in. long; leaflets membraneous, broadly-lanceolate, 3 to 5 in. long, 1¼ to 2 in. broad near the middle, base cuneate, tapering to a rather elongated blunt apex, margins thin recurved, the horizontal lateral nerves slender and reticulate veins very faint; petiolules about ½ in. long the upper part slightly winged by the decurrant lamina. Inflorescence in axillary or lateral racemose-panicles about 2 in. long, on slender peduncles of about ½ in. No flowers seen. Cocci 4 or less by abortion, slightly brownish-tomentose outside, and lined with short white silky hairs inside, about 1¼ line long and nearly as broad. Seeds globose, scarcely 1 line diam., glossy black.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.* There is a rather close affinity between this plant and *E. accedens*, Blume. They differ, however, considerably in foliage and inflorescence, the first being much more membranous, and the latter in its slender less spreading form and minute seeds. In one of the panicles of the New Guinea specimens I found the fragments of a flower which lead me to think that they are probably pink, like *E. accedens*.

Micromelum pubescens, *Blume.* *See* Ql. Fl., page 212, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order OLACINEÆ.

Cardiopteris lobata, *R. Br.* *See* Ql. Fl., page 251, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order MELIACEÆ.

Carapa moluccensis, *Lam.* *See* Ql. Fl., page 237, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order LEGUMINOSÆ.

TRIBE PHASEOLEÆ.

MUCUNA, Adams.

M. urens, *DC.*, **var papuana.** A tall climber, clothed in all parts with soft light-coloured hairs mixed with deciduous pungent hairs. Leaflets 3 entire, membranous, terminal one rotund-ovate 4 in. or more long, 3 in. broad, lateral

ones very oblique, about 4 in. long, 3 in. broad. Petiole 3 in. long, rhachis $1\frac{1}{4}$ in. long, slender, petiolules 3 or 4 lines long. Racemes short, about $1\frac{1}{2}$ in. long, bearing about 5 flowers, peduncles about 4 in. long; pedicels more or less curved, about 1 in. long. Calyx-tube campanulate, 3 lines long, lobes 2 lines, the upper 2-combined. Corolla about 1 in. long, the segments showing in the dried specimen whitish margins. The young pods on the specimens examined only about 3 in. long, but plainly showing the oblique pleats of the sub-genus CITTA; seed in these pods about 5. All the above is from some specimens collected by Sir G. R. Le Hunte. *See* "Ql. Agric. Journ.," IX, 410. I have now from Mrs. H. P. Schlencker a mature pod, and 5 seeds. Dimensions of pod $4\frac{1}{2}$ in. long, 1 in. broad, containing 5 black, flattish seeds, about $\frac{3}{4}$ in. diam. Mrs. Schlencker says that the flowers are white, and reminds one of a white *Wistaria.*

TRIBE DALBERGIEÆ.

INOCARPUS, Forst.

Among Mrs. Schlencker's specimens was a shoot bearing three leaves, and a few loose fruit, of what may prove an undescribed species of the above genus.

Branchlet with a very rough bark, curling back in short longitudinal pieces. Leaf or leaflet oblong, about 8 in. long and $2\frac{3}{4}$ in. broad, texture thin-coriaceous, slightly tapering at both base and apex, lateral nerves rather distant and irregular, looping far within the margin; the veins forming a close network, margins entire, slightly undulate. Petiole rugose, about $\frac{1}{2}$ in. long. Fruit red, in form resembling that of *T. edulis,* but much smaller, $1\frac{1}{2}$ to $1\frac{3}{4}$ in. diam. in the broadest part.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.* These fruits are used for food by the natives. The species might bear the name of *I. rubidus* should it prove new when more complete specimens are available. The Papuan name is Koba.

SUB-ORDER CÆSALPINIEÆ.

BAUHINIA, Linn.

B. Williamsi, *F. v. M.* "Papuan Plants," 61. Ripe fruit then unknown. Add to above description—Pod flat, $2\frac{1}{2}$ to $4\frac{1}{2}$ in. long, $1\frac{3}{4}$ in. broad, very shortly stipitate. Seeds, 2 or 3, about 8 lines diameter.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.* I cannot find any previous record of the pods.

Order MYRTACEÆ.

TRIBE MYRTEÆ.

Eugenia cormiflora, *F. v. M.* *See* Ql. Fl, page 659, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order LYTHRARIEÆ.

Lagerstrœmia Archeriana, *Bail.* *See* Ql. Fl, page 678, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order CUCURBITACEÆ.

Trichosanthes pentaphylla, *F. v. M.* *See* Ql. Fl., page 692, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order RUBIACEÆ.

OPHIORRHIZA, Linn.

O. Schlenckeræ, *Bail., sp. nov.* A straggling shrub of a few feet in height, more or less clothed with short woolly red hairs thickest on the

branchlets and inflorescence. Branchlets flattened or angular. Leaves membranous ovate to linear-lanceolate 3 to 6 in. long, 1 to $1\frac{1}{2}$ in. broad, tapering to a petiole about $\frac{1}{2}$ in. long, the apex almost thread-like, upper surface almost hispid, under surface, especially the midrib and lateral nerves, clothed with a purplish or reddish tomentum. Stipules tomentose like the leaves, with thread-like points. Cyme on a slender peduncle, 2 or 3 in. long on the rhachis of about 1 in., are 5 or 6 spreading branches, the upper half of which being occupied by the flowers. No flowers on specimen. Fruit about 4 lines broad, 2 lines long.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Gardenia papuana, *Bail.* "Ql. Agri. Journ.," XXIII., 218. Add to that description the following:—Corolla-tube $1\frac{1}{4}$ in. long, cylindrical, lobes 9 oblong, about as long as the tube, white. Anther half exserted.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Randia Macarthuri, *F. v. M.* "Notes on Papuan Plants," 68.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order GOODENOVIEÆ.

Scævola Kœnigii, *Vahl.* *See* Ql. Fl., page 907, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order APOCYNACEÆ.

CERBERA, Linn.

C. Odollam, *Gærtn.* var. Papuan name Tutula. This may prove, when more complete specimens are available for examination, *C. floribunda,* K. Sch., which the author says differs from *C. odollam* in its larger leaves on longer petioles, more crowded at the end of the branches, and its smaller fruit. Mrs. Schlencker's specimens only show terminal branch-bearing leaves 6 to 12 in. long, $2\frac{1}{2}$ to 4 in. broad, cuneate at the base, more or less acuminate at the apex, the petioles from $1\frac{1}{2}$ to $2\frac{1}{2}$ in. long, and rather slender. Fruit oval, somewhat flattened, 2 to $2\frac{3}{4}$ in. long, and about 1 by $1\frac{1}{2}$ in. broad, when dry, and cannot then be distinguished from *C. Od. var. Mugfordi,* Bail.—"Ql. Agri. Journ.," III., 282.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order VERBENACEÆ.

Clerodendron Cunninghamii, *Benth.* *See* Ql. Fl., page 1184, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.*

Order PROTEACEÆ.

?Helicia Forbesiana, *F. v. M.*, in Vict. Naturalist, iii., 63. Mrs. Schlencker's packet contained old fruit, and a branch bearing broken leaves, which probably belong to this tree.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker.* Tree, 40 feet high. Papuan name, Togona.

Order URTICACEÆ.

MAOUTIA, Wedd.

Flowers monœcious or diœcious, minute, in small cymose globose heads. Male flowers—Sepals 5 valvate, stamens 5, inflexed in the bud. Pistillode woolly. Female flowers—Perianth none. Ovary straight; stigma penicillate; ovule

erect. Achene ovoid, crustaceous or with a fleshy coat, hispid; albumen scanty, cotyledons oblong. Shrubs. Leaves alternate, crenate, tomentose and snow-white beneath. Stipules connate. Species Eastern Asiatic and Pacific.

M. rugosa, *Warburg*. Bot. Jahrb. XIII., 289. Papuan name Kobainitou. Diœcious, branches densely cano-villous. Leaves broadly-oval, rounded at the base or sub-cordate, apex acuminate or very acute, margins dentate, the under side with the nerves snow-white tomentose, upper side very rugose subglabrous or subasperous, 3-nerved, these nerves excurrent at the base upon the petiole; stipules large lanceolate, apex deeply bifid pubescent, lacinia subulate, pilose. Inflorescence (female) villose; achenes pyramidal-ovate.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker*.

Order FILICES.

Pteris comans, *Forst.* *See* Ql. Fl., page 1963, for description.

Hab.: Boku, British New Guinea, *Mrs. H. P. Schlencker*.

ASPLENIUM, Linn.

A. macrophyllum, *Swartz*. Hook. Sp. III., p. 158, t. 196-7. Rhizome repent; stipites tufted, 6 to 12 in. long, stout, erect, brownish, nearly naked; frond 6 to 18 in. long, 6 to 12 in. broad, with 6 to 12 opposite or nearly opposite pairs of stalked, nearly horizontal pinnæ, which are 4 to 8 in. long, 1 to 3 in. broad, the point acuminate, the edge sharply serrated, the two sides nearly equal, but the lower one narrowed rather more obliquely; texture subcoriaceous. Rhachis naked, firm, erect; veins very oblique. Sori in close long parallel lines reaching from the midrib nearly to the edge. This species, Hooker and Baker record from Polynesia, Malayan Peninsula and Islands, Hong Kong, Hindoostan, Ceylon, Mauritius, Johanna Island. It has also been recorded from German New Guinea. I, however, have not recorded it previously for British New Guinea, although I received my specimens from the late Mr. C. H. Hartmann in 1887.

ASPIDIUM, Sw.

A. (Sagenia) melanocaulon, *Blume*. Hook. and Baker, Syn. Fil. Rhizome ascending; stipites 6 to 12 in. long, ebeneous, glossy, scaly at the base; fronds 1 to 2 ft. long, 9 to 15 in. broad, ovate-deltoid, with a large, deeply pinnatifid, terminal pinna, and 1 to 4 lateral ones on each side; the central one deeply pinnatifid, with ovate-acuminate lobes, the lowest stalked, 6 to 12 in. long, 4 to 6 in. broad, often again pinnate at the base; texture papyraceous herbaceous; rhachis ebeneous; main veins reaching the edge, with numerous fine areolæ with free included veinlets between them. Sori numerous, minute, scattered. Indusium small, fimbriated, fugacious. Found in the Philippines and Malayan Isles. I have also a very small frond which was brought to me by the late Mr. C. H. Hartmann from British New Guinea in 1887.

ACROSTICHUM, Linn.

A. (Chrysodium) axillare, *Cav*. Hook. and Baker, Syn. Fil. Rhizome wide, scandent, flexuose, here and there branched, barren fronds 6 to 18 in. long, ½ to 1½ in. broad, lanceolate, more or less acuminate, the edge entire, the lower half tapering very gradually to the base or short stem; texture papyraceous; surface naked; midrib rather prominent, no main lateral veins; areolæ very copious with free veinlets; fertile fronds, 6 to 12 in. long, 1 to 3 lines broad, flexuose, on a stem 1 to 6 in. long. Met with in India, Burma, Philippine and Malay Isles. My specimens were gathered by the late Mr. C. H. Hartmann, in British New Guinea, some time in 1887.

Sericulture.

SILKWORM CULTURE.

Now that so much interest is being taken in the silk industry in Queensland, it is of importance that all information concerning the breeding of silkworms, raising of mulberry trees, treatment of worms, &c., should be available for all interested in the industry. To this end we publish a very excellent paper on the subject by Mr. David Gunn, Acting Government Entomologist of the Transvaal, which appeared in the "Transvaal Agricultural Journal" of July, 1909. This paper will, we feel sure, be eagerly and carefully read and studied by young and old, who are now engaged in building up the industry. The paper commences with an historical account of the business of sericulture from the year 2640 B.C. This portion we omit as not directly bearing on the practical side which we wish to place before our readers. Then follow:—

GENERAL DIRECTIONS.

Before proceeding to give a description of the methods used in connection with the rearing of silkworms, it is considered advisable to state here that the leaf of the mulberry is the natural and most nutritious food for the silkworm. There are several varieties of mulberry, but the white mulberry (*Morus alba*) has been found to be the most suitable food, and hence is the variety which is recommended to be used for this purpose.

The following information regarding the culture of the mulberry, which has been kindly prepared by the Acting Conservator of Forests, is given for the benefit of those people who intend to commence sericulture:—

"METHODS OF PROPAGATING THE MULBERRY.

"There are two ways of propagating mulberry trees:—

"1. By seed.

"2. From cuttings.

"1. The seed should be sown broadcast in a well-prepared bed and then covered with a thin layer of sand. If the seed is sown early in spring, the seedlings may be planted out into nursery lines during the rainy weather before Christmas, but it is advisable to leave them in the bed until the following winter when they can be planted out where they are required.

"2. Mulberries strike very readily from cuttings, and this is the easiest way of propagating them.

"Cuttings 12 in. long should be made in July or August when the growth is dormant. In making the cuttings it is important to cut the wood to within a quarter of an inch of a bud at each end. If the cuttings cannot be planted immediately after being cut from the tree, they should be heeled in the ground and kept moist and shaded so as to prevent drying out.

"In planting the cuttings two buds only should be left above the ground; this will generally mean that 3 in. of the cutting is above ground and 9 in. below. The ground in which they are planted should be well worked, and if it is soft it will be sufficient to dig a trench 1 ft. deep and 1 ft. wide, but where the ground is hard a trench 3 ft. deep and 2 ft. wide should be made. The soil round the cuttings must be pressed down firmly with the foot after planting and then be well watered.

"In order to successfully raise trees from cuttings they must be constantly watered during the dry weather in early summer, and on no account

must they be allowed to dry out. From this it will be seen that it is useless to attempt to make a hedge with cuttings unless water is available, and it would be preferable to strike the cuttings in beds where water is available and transplant them the following winter.

"*Methods of Planting.*—The mulberry trees can be grown as a hedge or as single trees. For purposes of silkworm rearing in other countries, great attention is paid to the proper growth of the trees and they are treated very much like fruit trees, being planted 15 ft. to 25 ft. apart and pruned with great care. Pruning is done with the object of getting a low-growing, well-formed tree, so that the leaves may be gathered by women and children from the ground. In pruning, the same principles are used as for fruit trees.

"In this country mulberry trees are being largely planted as hedges; these will serve the double purpose of providing shelter and leaves for silkworm feeding. In planting hedges the cuttings or trees should be spaced 3 ft. apart in single or double rows according to the amount of water available. If the soil is dry a single row would be best, but where irrigation is possible they could be planted in two rows with the trees alternating.

"The white mulberry is a very rapid grower, and cuttings planted in July or August will yield a fair quantity of leaves the following February or March, but if it can be avoided it is not advisable to strip leaves from trees under one year old.

"In many countries the trees are allowed to grow for five years before being stripped, and they are given a rest for one year after every period of five years.

"It is very important when stripping the leaves not to denude the tree entirely, but to leave a few leaves at the end of each branch. Another important point to be observed is that the leaves should be nipped off singly with the thumb nail or be stripped upwards from the branch so as to prevent the bark being injured as would often be the case if they were stripped downwards from the top of the branch.

"The quality of the silk produced is greatly influenced by the quality of the leaves used in feeding the silkworms, so that every care should be taken to produce good leaves.

"The leaves should never be picked when they are wet, as they are then liable to seriously affect the silkworms; and they should be crushed as little as possible. With this object in view it is advisable to gather the leaves into a bag hung on the branch of the tree and fastened with a hoop at its mouth to keep it open.

"The white mulberry (*Morus alba*) is considered the best species for silk production. It is a drought-resisting tree and thrives well in the Transvaal, more especially in the warmer localities. In cold parts of the high veld it is apt to be cut back by late frosts in spring, which often retards its growth and even kills the smaller branches."

The most suitable ground for the growth of the mulberry is a high and fairly level piece of land to which the wind has free access. It is not advisable to plant it on low lying or too well protected land, as it has been found in other countries that such ground merely serves as a breeding place for all manner of disease which first attaches itself to the leaf and thus finds its way into the body of the worm.

Plucking the Leaves.—The plucking of leaves ought to be done in the morning after the dew has evaporated, but in general practice one frequently plucks to suit his convenience. Leaves may be stored in a room

set apart for the purpose, and for two or three days retain their moisture. Neither sun nor wind should have access to the store-room, and water may be sprinkled over the leaves to enable them to retain their moisture, as the leaves must in no case be given in a withered condition; on the other hand, too much sap in the leaves will be harmful to the worms. In order to prevent fermentation of the leaves they should be spread out for an hour or so before being fed to the worms.

The age of the leaf should be relative to that of the worm, as it has been found by practical experience that young worms which are fed on old leaves, or old worms fed on young leaves, are very liable to succumb to various diseases, and although such may not die they will scarcely moult, or will spin indifferently.

THE REARING OF THE SILKWORM.

Rearing Rooms.—One of the most important features to be considered in connection with the rearing of silkworms is provision of a suitable building, as success primarily depends upon the accommodation which is provided. Our experience in the Transvaal goes to prove the fact that a brick building with a thatched roof is undoubtedly the best for this purpose, more especially on the high veld, where the nights during the summer months are frequently cold. An iron building is considered to be most unsuitable, as it becomes very warm during the day and too cold at night; consequently it is extremely difficult to conveniently regulate its temperature. An open fireplace or hot-water pipes would be the best means of heating such a building, but such methods would be too expensive for the ordinary person who intends to commence this industry in the Transvaal, and, therefore, they cannot be generally recommended. If, however, the temperature of the rearing room should happen to fall below 68 deg. Fahr., an ordinary paraffin stove could be used to raise the temperature.

The silkworm is not a tropical insect, and attains its best development between the temperatures of 68 deg. and 77 deg. Fahr. Sericulturists should, therefore, remember that the temperature of a rearing room should not fall below nor exceed the abovementioned limits, as if such should occur it would undoubtedly prove detrimental to the worms and, consequently, seriously affect the quantity and quality of their spinnings.

The rearing room should also be dry, free from draughts, with a supply of fresh air, and protected from direct sunlight. It should also be evenly lighted, so that the progress of all the worms may be similar, because if kept in the dark they eat little and their growth is retarded.

Implements Required for Rearing Worms.—It is a notable fact that the initial expenditure required for commencing silkworm culture is smaller than for almost any other industry, and this factor should act as a stimulus to the encouragement of sericulture. The profit which would be derived from the sale of cocoons during the first year would more than remunerate one for the initial cost. The following is a list of the articles which are considered indispensable for starting this industry:—

1. Several light movable stands upon which shelves should be placed. These shelves should be at least 3½ ft. wide, and a space of fully 18 in. left between each shelf. In order to prevent unnecessary expenditure to those who cannot afford to purchase wooden shelves, strong reeds could be utilised for this purpose. In order to ensure proper ventilation these stands should be placed in the centre of the rearing room, and if it should be found that ants are troublesome the ends of the stand should be placed

in shallow tins containing a small quantity of paraffin which could be renewed at intervals. The most effective and cleanest method, however, for preventing ants from crawling up the stands and annoying the worms is to tie a small quantity of cotton-wool around the legs of the stand half-way between the floor and the first row of shelves.

2. A few sheets of brown paper, or blotting paper, for placing over the wooden shelves or reeds.

3. A small ladder for reaching the higher shelves, which could be manufactured on the premises.

4. A large knife for cutting the leaves and a basket for distributing them to the worms.

5. A thermometer for registering the temperature.

6. Trays for holding the worms. For young worms which have newly hatched from the eggs the most serviceable and inexpensive tray to use is mosquito netting stretched over light wooden frames, 24 in. long by 18 in. wide. After the worms have attained a larger growth, fine wire netting, ⅝ in., should be used. Fine cord netting, which is manufactured locally, could also be employed for making trays. It is not desirable to use a smaller size of tray than the one described above, as it would not only mean an unnecessary amount of labour in the manufacture, but would also involve a greater amount of trouble in handling the worms.

7. A supply of sulphur for disinfecting the rearing room; some dry bush which is odourless and free from gum, to construct spinning places for the worms.

8. It has been found on several occasions in the Transvaal that bats, fowls, cats, mice, and rats have proved very troublesome in destroying silkworms, and in such cases it would be advisable to keep a small supply of wire netting on hand so as to be able to protect the worms if they are attacked.

Disinfection.—Cleanliness is absolutely necessary in connection with sericulture, and this point cannot be too strongly emphasised. Before starting the rearing of silkworms all the shelves and implements should be thoroughly cleansed with a solution of sulphate of copper in the proportions of 1 part of sulphate of copper to 100 parts (by weight) of water, *i.e.*, 1 lb. of sulphate of copper to 10 gallons of water. This should be done about a fortnight before the introduction of the worms.

When all the appliances are ready the doors and windows should be tightly closed, and the rearing room fumigated with sulphur (about 11 lb. to every 100 cubic yards of space). In order to have the room properly fumigated, the following directions should be carefully observed. The sulphur should be powdered and placed in an earthen vessel over a slow fire. When the sulphur melts and catches fire of itself the vessel should be immediately placed in the rearing room, with the windows and doors completely shut for fully twenty-four hours.

After fumigation, the walls of the room should be thoroughly white-washed with lime, and the floor with a solution of sulphate of copper. The fumes of sulphur kill germs of disease which may have escaped the action of the sulphate of copper.

Ventilation.—Another important consideration in the successful rearing of silkworms is ventilation, as the worms should be surrounded continually by pure air. In order to ensure a proper system of ventilation, double openings should be made in the windows which would permit the heated bad air to pass out above and the cool fresh air to enter below.

SILKWORM EGGS—HOW TO HATCH THEM.

Upon receipt of the silkworm eggs they should be washed in a solution of sulphate of copper in the proportion of 1 part to 100 parts of water (by weight), and immediately afterwards placed in a shady place to dry. Great care must be exercised in this process, because when eggs are washed in this solution it is absolutely necessary to get them dry as quickly as possible. The eggs must not be exposed to the direct rays of the sun. Shortly before the eggs hatch they assume a whitish colour. The best method to adopt is to place double pieces of mosquito netting lightly over the eggs, upon which finely cut mulberry leaves have been placed, the idea being to prevent the unhatched eggs which become attached to the netting from being removed with the new-born worms to the trays. If such worms hatched at a later date, the natural consequence would be that worms of different sizes would be mixed up on the same tray, which should be carefully avoided.

(To be continued.)

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1908.		1909.										
	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
North.													
Bowen	0·42	0·42	15·48	4·52	1·06	1·15	2 32	1·98	1·23	0·13	0·21	0·36	3·15
Cairns	1·60	1·41	32·05	5·25	21·03	14 19	1·06	2 48	0·65	2·48	0·7	3·19	7·31
Geraldton	3·80	1·69	47·92	10·29	37·31	28·51	5·98	9·13	6·53	5·32	0·36	6·71	14·57
Gindie State Farm ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Herberton	0·61	0·78	12·41	2·28	3·52	0·70	0·81	1·22	0·20	0·75	0·50	2·30	4·50
Hughenden	1·94	1·05	7·55	1·55	2·86	...	Nil	1·71	1·37	0·33	0·8	1·95	0·54
Kamerunga State Nurs.	1·69	...	...	3·52	...	4·95	0·97	...	...	...	...	...	...
Mackay	2·57	0·02	15·00	1·36	9·00	2·59	2·33	2·05	4·00	0·75	0·73	2·88	3·18
Rockhampton	2·47	1·37	9 01	2·01	1·68	1·21	0·03	1·33	2·99	1·37	1·20	2·16	4·55
Townsville	1·26	0·07	6 94	1·70	7·01	1·28	1·07	1·51	0·83	0·57	0·12	2·07	1·31
South.													
Biggenden State Farm	2·12	3·66	7·37	2·68	2·45	2·00	0·72	2·60	4·01	1·78	0·29	...	2·83
Brisbane	2·25	1·28	1·99	2·72	2·65	4·67	0·82	1·75	2·10	2·44	2·74	1·56	4·14
Bundaberg	0·73	3·34	6·52	3·70	5·06	1·54	0 67	1·51	5·65	1·66	0·98	0·42	3·55
Dalbyl	3·65	1·56	1·46	3·55	0·99	1·60	Nil	1·87	1·19	3·13	0·47	1·92	2·13
Esk	5·99	3·62	2·64	3·21	3·27	5·03	0·36	2·43	2·74	3·31	2·60	2·61	2·69
Gatton Agric. College	5·71	1·29	1·94	5·00	3·18	3·82	0 32	1·22	2·02	2·09	2·29	1·87	...
Gympie	2·58	3·97	3·86	3·77	3·41	2·34	1·15	2·96	4·70	2·80	1·70	2·30	3·82
Ipswich	5·09	1·05	1·37	1·95	2·66	4·56	0·05	1·31	1·67	1·34	3·55	1·93	1·56
Maryborough	1·92	1·64	8·36	7·11	2·28	2·4	0·91	2·57	5·02	2·53	1·56	0·51	3.94
Roma	2·79	1·68	5·19	4·85	4·18	1·91	0·44	2·73	1·54	4·83	0·12	0·90	2·12
Roma State Farm ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tewantin	7·50	4·12	6·44	3·31	4·34	9·37	1·00	3·24	4·08	4·24	1·38	3·82	1·90
Warwick	5·28	2·02	0·87	0·82	1·30	2·21	0·70	1·23	2·04	2·28	1·77	2·85	2·77
Westbrook State Farm	2·05	...	...	2·61	1·43	...	...	...	...	...	...	...	...
Yandina	6·03	2·75	6·69	6·42	3·71	5·25	1·10	2·70	3·70	5·81	3·84	2·30	0·76

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND,
Divisional Officer.

Apiculture.

HONEY-BOTTLING.

It is not so difficult as some may imagine, nor so slow as many might suppose. The first thing is to have your bottles all cleaned and ready, and the best time to do this is the day before filling. Not only are they less in the way, but in better condition for wiping before labelling.

Formerly we would wipe them after being filled, just before wrapping them, previous to packing them. We found, however, that they were then much harder to polish after the hot honey was in them, so we now do this before filling and when still moist from the washing. It is for this reason we do not let them dry in the sun, but as soon as washed place them inside or in a shady place.

In washing it is easier and better to use plenty of water, and three pails are preferable to two. It is for this reason we prefer doing this work near a well. It is an easy matter for two persons to examine and clean six gross or more in a day.

Next in order is the filling. We always warm the honey before doing this. To keep it from granulating is not the only reason. It would be too slow work otherwise. The temperature we prefer is 178 deg. Fahr., and we never want it more than 180 deg., believing that, if much hotter than this, the flavour is injured; and if allowed to come near the boiling point the honey is darkened as well. The round all-glass dairy thermometer is best for this purpose. We suspend it by a string from the top of the can so it is always ready for examination.

The question is now, when and how shall we heat the honey? The kitchen stove will do, but we do not recommend doing it there. We prefer warming it outside, and as near the back door as we can get.

With a readily movable stove we can warm honey as fast as we can fill 1 lb. bottles or smaller. As it takes about an hour to get the first lot ready, by starting at 7 o'clock, the honey will be ready by 8. We can then take off 40 lb. every half-hour, which means one hour for this quantity when using two tins. This would be from 700 to 800 1 lb. bottles in a day. If the honey is granulated it is absolutely necessary to stand it in water; and then two boilers on a cook stove would be better. You do not require to use water if the honey is sufficiently liquid to pour. Though honey is strained as it comes from the extractor, we do this again through thin cheese cloth on the can we fill from. Keep the honey on the stove covered also, if for no other reason than to preserve the aroma. When filling 1 lb. bottles we take the tare of each, using a double-beam scale for this purpose. We can then guarantee each bottle to hold this quantity. The bottles to be filled are piled up behind the one who does the wiping and labelling. They are then handed to the one who does the filling, who, in turn, gives them to the person who covers and puts them away. If a child is to do the labelling it is best to have the bottles wiped beforehand. They will then be encouraged by easily keeping ahead. If short of help, label also beforehand, but it makes less handling when all is done at the same time. We always use gummed labels, and we moisten the gum by placing them in a folded cloth kept wet. This is better than doing it with the tongue. We think the label looks better when placed about half way between the centre and top. Never put it across the centre of a bottle. We prefer a label going across rather than one up and down, believing the former shows the honey off better. Have "Pure Honey" in clear bold type; next the directions small, and then the name and address below.

As a customer will invariably prefer a bottle with a cover rather than one with a cork, and as they can be bought so cheaply, we see no reason for using the latter. Should you wish to do so I would soak the corks for a few hours before using unless you wish to seal while hot. Soaking them not only gathers up any cork dust found in the crevices of large corks, but makes them fit much better. They must be allowed to dry before sealing, should you wish to do this. We prefer pure beeswax for this purpose. Have it kept hot, and invert the bottle, holding it perpendicularly when placing in the wax. You may require to dip the second time. Before sealing, cut off any projecting cork with a sharp thin-bladed knife. If you wet the corks first they easily pound in level, using a wooden mallet. If you wish something cheaper than beeswax, then combine equal parts resin with about one-fifth tallow. A little vermillion will improve the colour.

We use only warm water for washing the bottles when it is too cold to be comfortable without. On a hot day the cold water is preferred, but on a cold day the warm is better. Never wash them in the house unless you are obliged to. Only the water that is used for the first rinsing is changed, as it, of course, needs changing most. The one that was used for the second rinsing now takes first place, and the one for the final rinsing the second place, so that we always have the clean water for the last rinsing. With the "readily movable" stove it will warm as fast as required.

As to wiping the bottles, this is done only on the outside. After standing for an hour or so to drain over night the hot honey will attend to the inside. In wiping, all that is necessary is to hold the bottle in one hand, then with the other hand and a soft towel encircle as much of the bottle as you can, and go from top to bottom, then turn the bottle around and do the other side the same way. This is all that is required. When filling, have a towel and water handy so that only clean hands touch the bottles. They willl then not require any more wiping. The papers we use for wrapping are old newspapers. A thin-bladed honey knife is the best for cutting to desired size. Wrap as soon as cold, and before any dust can gather on them. There are two ways of doing this. One is by folding as you would a parcel, and the other by rolling the bottle in the paper. The latter is preferable. When folding in the ends, always begin where the paper ends.

They are now not only ready for delivery or shipment, but if there is any leakage the paper will show it. Before doing this we go over the covers and see that all are reasonably tight. If those with cardboard covers have been properly put on they will not require tightening—not so, however, with the fruit-jars. I think having all this done at one time is better than having to give them a "bath" before being able to fill an order, and they will look just as "fresh and clean" after three months as they do the day they are wrapped. I have had occasion to liquefy some that had granulated in the bottle, but I never do it from choice. Unless one had extensive appliances for heating, it would be altogether too slow. Then one can only guess at the temperature; and the filling is not only slower, but it is impossible to be as accurate.

I decidedly object to handling hot bottles, whether for cleaning or labeling. They get warm, it is true, when bottling the honey hot; but it is not until they are placed away after covering.

We prefer, when warming the honey, to have one more tin than the number on the stove, so as to have one ready to put on immediately when one is taken off. We perfer to have about 40 lb. in each, except when beginning, when we have about half as much in one, till we get a start. Any tins will do for this purpose. Ours are round, holding fully 50 lb.; have handles to lift off with, and are made of heavy tin. The 60 lb., same as you store honey in, will do, but I prefer the top all open.

When filling without weighing, you should have your bottles a little fuller than you wish them when cold, as the honey occupies more space when hot.

Thus writes Mr. C. Deadman in "Gleanings":

One of our most expert apiculturists, Mr. G. Tanner, says, with reference to bottling honey, that the best plan is to heat the honey in a vessel with a 6-in. opening, and to keep this loosely covered during the heating. If a kerosene tin is used and the whole top is open, the steam will get to the honey and spoil it. Honey should not be bottled hot, as a white scum will form on the surface in the bottle, making it unsightly. Twenty-four hours should elapse between heating and bottling. Bottles should be filled up to within a quarter of an inch of the cork. When heating the honey, the vessel containing it should rest on two blocks of wood placed on the bottom of the water vessel. This prevents the honey vessel from coming into close contact with the heated stove. If the vessel rests on the bottom of the vessel containing the heated water, the honey will become too hot and be spoilt. If corks are used, they should not be wetted, as they take a long time to dry and wax will not stick to a wet surface. The best way is to place a square of thin, tough paper over the mouth of the bottles, then press the cork down over the paper, the exposed edges of which are trimmed off with a sharp knife. The bottles should not require washing after filling. A good bottler will not allow a drop of honey to fall on a bottle. If this should happen, it is exceedingly difficult to clean the bottle properly.

THE WORK OF THE INTELLIGENCE BUREAU.

Some time ago, a letter was received by a gentleman connected with farming and pastoral pursuits in Queensland, propounding a number of questions concerning the land laws, facilities for taking up land, &c., &c., in this State. These questions have only lately been forwarded to us, and we have no hesitation in stating that every question can to-day be truthfully answered by the department presided over by Mr. Gordon Graham.

After a few preliminary remarks on the sparseness of our population as compared with the immense area of the State, and on the fact that such numbers of persons live in the towns instead of on the land, the writer goes on to ask:—

What do statistics such as these convey to the bucolic mind? What the British farmer and farm labourer want to know is:—Where are the agricultural lands situated? What is the soil like? Are the lands well watered? Are they level or mountainous? Do they consist of open plains or are they heavily timbered? What crops can be grown on them, and what animals can be reared on them, either on the natural or on artificial grasses? At what distance from a railway are they situted? What taxes have to be paid by the farmer? How much capital is needed to make a start and to carry on until crops can be harvested? What is the cost of clearing? What rate of wages is paid to farm labourers? What is the cost of living—of clothing—of farm implements—of horses—of dairy stock? What markets are there for produce? Which are the most advantageous districts to settle in? Is there a market for the timber when clearing the land? At what price can good land be obtained? What conditions are imposed on the settler?

Questions such as these require to be clearly and truthfully answered. And they can be so answered by officials of the Intelligence Bureau, who have an intimate knowledge of every part of the State, and who have been specially selected for their acquaintance, some with the land laws, some with the agricultural, others with the pastoral industry. To-day there is no need to address these inquiries to a newspaper or to this journal. Inquirers need only address themselves to the bureau of information to be satisfied on all points.

Tropical Industries.

FIBRE-EXTRACTING MACHINERY.

We are in receipt of a letter from Mr. Thos. Barraclough, the well-known London manufacturer of fibre-extracting machines, in which he says, referring to our chapter on sisal machinery in the pamphlet issued by this department on "The Sisal Industry in Queensland":—

"I note your remarks about the various fibre-extracting machines (including my own). Many improvements have been made in the large machines (100,000 to 150,000 leaves a day), which are undoubtedly the machines of the future. I know of a new one now being brought out by a gentleman, formerly one of my draughtsmen. He went out to the West Indies some years ago, and has managed a large plantation of 10,000 acres of sisal. He has a very practical knowledge of the leading large machines set forth by you on page 29, their advantages and their defects, and he has designed a new machine, embodying all the good he has been able to detect and invent. His machine will clean 150,000 leaves daily. He sums up his practical advantages thus:—

"Great reduction in power required.

"Great reduction in wear and tear and expenses.

"Enormous reduction in waste, consequently a much larger percentage of good fibre.

"Better quality of fibre produced.

"In a short time the machine will be made public, when particulars will be sent to you."

In reference to this matter of fibre-extracting machinery, the editor of "Tropical Life," London, which journal devotes much space and attention to the fibre industry, writes on 9th July as follows:—

This month we will turn, by special request, as the concert programmes say, to the machinery necessary to clean the fibre, and whilst doing so our readers will, we feel sure, excuse us if we do not confine our remarks entirely to sisal cleaning machinery. As Mr. McCollough, the secretary of the Davao Planters' Association, Philippine Islands, very truly says, referring to manilla fibre planting, "With . . . a machine that can turn out from 800 to 1,000 lb. of fibre per day* the future of manilla hemp-raising presents new and more promising features."

There are, roughly speaking, about a dozen fibre machines, less rather than more, worth even thinking of. Even of these, how many can be relied upon to give continuous satisfaction is very doubtful. As regards sisal, we know that friends in the West Indies, who have some 4,000 acres or more under cultivation, besides three or four times that area which they hope in time to cover with sisal, have, after trying several machines, imported a Bœken extractor as being preferable. We have heard many reports—more or less inspired, perhaps—on other well-known machines that caused us to wonder why the company were not better satisfied with them, so we asked the reason, which, summed up in a single sentence, amounted to the fact that, after trying the other machines, they preferred Bœken's, and so, now that they were about to considerably extend their cultivations, they had got out a very large plant—I believe, the largest individual machine yet made—and are going to rely on it in preference to the other makes. We hope to be favoured with the results of the experiments, and to be able later on to show how far their belief in the machine has been justified.

* Against 15 to 20 lb. per man, as at present.—Ed. "T. L."

The ever-increasing acreage being put under sisal is causing more and more demand to arise for suitable and reliable machinery, both for large and small areas, to clean the fibre. There is also no doubt that, once the confidence of the smaller planters—say those with 500 acres and under—in any one machine is established, a much larger number will take up sisal cultivation in Queensland, the West Indies, the Bahamas, Mauritius, Texas, Yucatan, Hawaii, &c. At present such men are prevented from doing so owing to their not being satisfied with the machines that they have come into contact with, and their lack of knowledge about the one or two machines that seem best able to do the work required of them. To our mind, what should be done is to put up a large central factory (to be fed by tramlines and overhead ropeways), somewhat in the same way as the British Cotton-growing Association has erected large central ginneries in Africa and elsewhere. This would enable the planters around either to sell their leaves outright to the factory at a price based on a sliding scale adjustable to the European and American price of the fibre, or else pay so much per ton of cleaned fibre obtained for having it cleaned. Such a central factory should, of course, be run on co-operative lines, so that the profits can be divided among the planters, and thus avoid unnecessary haggling and disputes as to price for the work to be done. Central factories run by the smaller planters would also, since they cause the cost to fall less heavily on individuals, tend to encourage further attention to improvements in the machines used, and also enable adequate attention to be given to the utilisation of bye-products, such as working up the waste fibre into cellulose or pulp for paper-making, and utilising the leaf-refuse and juices for fertilising the land whence they sprung, either alone or in conjunction with fertilisers made up to specified formulæ.

Conducted on these lines, there is no doubt that the cultivation of sisal and other Agaves, Fourcroya, &c., would be greatly extended, as the cost of preparation would be reduced to a minimum, and the utmost value obtained not only for the fibre itself, but also for the bye-products of the plants, valuable matter which at present is allowed to go to waste.

We do not yet know how far the Bœken extractor, as at present constructed, is suitable for manilla hemp; it may not be at all suitable, as the machines are specially built to treat the leaves of the Agave, Fourcroya, and Sanseviera families, and it has still to be seen how they can clean the *Musa textilis*. With this fibre-producing plant it is variously estimated that from 20 to 30 per cent. of the fibre is wasted owing to the crude native methods adopted for extracting it. Several attemtps have been made in the past to perfect machines for extracting the fibre economically, but up to now, the natives have not taken to them. The waste fibre, again, if needed for paper-making, must not be too much injured by the juice and pulp. "If," it is urged by American paper-makers, "waste fibre can be utilised for paper-making, it will be nothing more nor less than a godsend to the manufactures of rope paper in the United States of America, who are altogether dependent upon old rope for paper-making purposes."

THE SMYRNA FIG.

The following report appears in the July number of the "Quarterly Journal of the British Chamber of Commerce of Smyrna":—

The two best-known varieties of fig grown in the province of Smyrna are the "Sari lop," the famous dried fig of Smyrna, and the "Bardajik," usually eaten in a fresh state.

The peculiarity of these figs is, that their skins under favourable conditions dry tender, which is not the case with other varieties, and, as a dried fig cannot be peeled, its skin influences its quality considerably.

The "Sari lop" is a large fig, hence the great demand for it in foreign markets, but the "Bardajik," though smaller, makes a sweeter and finer flavoured dried fig. This latter is called "Sheker Injir" (Sweet fig) in its dried state.

The fig grows very easily from cuttings, grafting or seed. Preference is given here to cuttings which are planted out where they are to grow into trees. The cuttings strike root very easily. The custom is to put the cuttings in the ground at an angle of about 45 in., buried right up to the top with only the leaf bud appearing above the soil; and, for protection in frosty weather, the bud also is covered temporarily with an inch or two of soil. Cuttings bear fruit in three or four years. Off-shoots or suckers are sometimes used; these are cut off the parent tree with a few small roots attached.

For the fig to reach full-sized maturity caprification must be resorted to, which is carried out by a very small fly.

This fly coming from the edible fig deposits its eggs in the seed of the fruit of the wild fig tree, which bears an autumn fig called "Bogha," and passes thence to a fig appearing in the spring on the same tree called the "ilex," commonly and erroneously known as the "male" fig.

The edible fig tree bears fruit later than the second crop of the wild fig tree, and the fly passes on to that in turn and then back to the "Bogha" fig.

In order to control the caprification, it is found desirable that the wild tree should be planted apart from the edible fig tree. Over caprification is apt to spoil the fig, which drops off prematurely as a result.

This fly is considered essential to the successful growing of the Smyrna fig, but so far it has not been exactly decided whether for cross fertilisation from the wild fig or merely from one fig to the other of the same variety.

Five to twenty "ilex" figs are hung in strings when ripe on each edible tree, according to size, and there left until the fig season is over.

The wild fig tree is more subject to frost. Though leafless during the winter, the "Bogha" fig, then on the tree, continues growing, and it is supposed that the necessary movement of the sap renders the tree more tender than the others of the genus which are then in a dormant state.

All the Smyrna varieties grow anywhere in this district within a certain distance from the sea (about 100 miles) and prefer calcareous soil, but all figs become sweeter growing on hillsides with a southerly aspect. Too much moisture spoils the quality of the fig, though the crop may be greater and the size of the fruit larger.

Young trees always produce the finest fruit.

When the fig, either the "Sari lop" or "Barkajik," reaches maturity it requires dry weather to make it white and mellow. At this season, August and September, the prevalent winds are from the north and east, and, being dry, they are well adapted to the requirements of the fig.

The dried fig is a product of the Meander Valley, where the climatic conditions allow it to dry properly. This is attributed to the conformation of the valley, which is protected by hills from the sea breezes. The soil, which also plays so important a part in the cultivation of the fig, is calcareous here; there are also iron mines in the neighbouring hills, and it is claimed by one authority that ferruginous detritus helps to make this district the garden of the fig.

The best districts in the Meander Valley are Inovassi (between Karabounar and Baladjik) and Ortaxe.

The last named district produces a fig superior in size, richness of pulp, and thinness of skin.

In Strabo's time the figs of Antioch, which town possessed a large tract of country on both sides of the Meander, were noted as the dry figs of Antioch, and the tree on which this variety grows is called "Trephyllus."

Ortaxe is close to Antioch.

All attempts to produce it successfully elsewhere than in the Meander Valley having failed, the dry fig has come to be looked upon as a peculiarity of this district.

Valleys in the neighbourhood apparently identical have been tried without success.

The fig is allowed to remain on the tree until it begins to drop off, when the crop is gathered by hand or knocked off by sticks.

The partially dried fruit is spread on mats to dry in the sun for three or four days, and is then sent to market.

The operator, in "working" the figs for packing, dips his fingers into brine to prevent them from becoming sticky. The salt, besides destroying the worm to which the dried fig is subject and acting as a preservative, is supposed to help in the sugaring process.

Some recmomend immersion in boiling brine as a means of sterilisation. The figs are put in baskets or perforated metal drums and immersed about five minutes in the boiling brine. It is contended, however, by others that this process alters the taste of the fig and spoils those of the finer quality.

The figs when ready are shipped in small boxes or bags.

For home consumption dried figs are sometimes baked to a light brown colour; baking gives them a pleasant flavour. Sometimes the figs are stuffed with walnuts or other nuts and spice, then sprinkled with sesame seed before baking.

THE BANANA INDUSTRY.

Since the visit of the Under Secretary, Department of Agriculture, and Mr. Turner, of Victoria, to the banana-growing districts of the North, such satisfactory concessions to growers appear to have been made by the Victorian Government that it is probable that the area under banana cultivation in North Queensland will be largely extended. The unquestionable importance of the banana trade to this State makes it desirable that those who are entering upon the business for the first time should be properly instructed in all that concerns the cultivation and marketing of a crop which knows no seasons, but bears fruit all the year round. Mr. A. H. Benson, Instructor in Fruit Culture ,has written voluminously on the subject of banana cultivation, and we merely reiterate his instructions in the present article, emphasizing them by a reference to an excellent paper on "Banana Cultivation and Fertilisation in the West Indies," by H. C. Henricksen, which lately appeared in London "Tropical Life."

The writer of the paper in dealing with soils, says:—The ideal banana soil is one containing an abundance of moisture without being subject to periodical droughts, an abundance of humus and plant food, and so situated that it is, or can be, properly drained. These ideal conditions are seldom combined in the West Indies, but most islands possess means to create such conditions artificially.

The humus, while it is desirable, is not absolutely essential, because most of the soil producing bananas in Jamaica contains but very little humus. The typical soil in the Annatto Bay and Port Antonio districts, on the north coast, is a rather heavy clay, but the most profitable plantations are on soils of a loamy consistency.

Soils which have produced bananas for years, and which used to produce a great many—twelve to fourteen hand bunches with fingers—like the Bluefields, are now producing smaller bunches, and the size of the individual fruit has decreased. The causes of this are undoubtedly that the physical conditions of the soil are not as favourable for the banana as when the land was virgin, and that the available plant food is exhausted.

Water.—There seems to be no exact data on the amount of water actually necessary to produce a bunch of bananas, but from all indications the banana needs a great deal of water, probably as much as sugar-cane, which was found by Maxwell in Hawaii to be from 75 to 100 gallons per lb. of sugar. Bananas succeed well under irrigation. In Jamaica, near Spanish Town, there were, on 31st March, 8,300 acres of bananas under irrigation, for which 11,376 cub. yds. of water per hour were being used.

Temperature.—While the banana is, strictly speaking, a food in the West Indies, it is used in the north as a dessert, and must, therefore, compete with whatever dessert fruits that may happen to be in the market. For obvious reasons the greatest demand for bananas is from December to May, and that is the time to sell and obtain a fair price. In order to produce fruit that will be marketable at that time of the year the temperature must be tropical in every sense of the word, because a few days cold weather will spoil all calculations.

Wind.—Another factor, when selecting a locality, is the wind. Strong winds are ruinous to the banana plantation. The large leaves of the banana plant are necessary for the making of strong plants and first-class bunches of fruit. Therefore, when cut into ribbons by the wind, vitality is lost and the growth is checked.

A Bunch of Bananas.—In Jamaica, a bunch is nine hands; three-quarters of a bunch, eight hands; and a half-bunch, seven hands. This year, the price paid to growers was about 60 cents per bunch in the winter months, with declining prices as the season advanced. It needs no argument to show the necessity for full branches. While nine hands sold for 60 cents, the decrease of one hand cut the price to 45 cents, and the decrease of two hands cut the price in half. After 15th July, the bunch usually sells for less than 25 to 30 cents, and the halves and the quarters are almost unsaleable.

Bringing the question down to a business basis we find two factors involved—viz., time of maturity and size of the bunches. The time of maturity can be regulated by the time of planting, provided all the conditions are normal. A plantation which is not subject to high winds, or colds, or drought, will, in a certain locality, mature fruit in a given time after planting. Say that the normal time is ten to fourteen months, then the plants should be set the latter part of January or the first part of February. The suckers for the second crop should be timed also. If a sucker appears so early as to mature fruit before December, it should be cut out and a smaller one left to produce the next crop.

The determination of the size of the bunch is probably less understood by the average planter than any other question connected with the business. The fruit, and the male or those which do not develop into fruit. The first kind through the top of the stem, bends over and hangs down, resembling a bottle. Later, the dark fleshy bracts open and curl up, leaving the flowers exposed. Of the flowers there are two kinds, the female or those which develop into fruit, and the male or those which do not develop into fruit. The first kind are the ones first exposed, and after the bracts have dropped the number of hands can be counted. The bunch of flowers remaining uncovered is not fruit producing, and is, as a matter of fact, superfluous to the cultivated banana. We therefore see that the size of the bunch depends on the number of fruit-producing flowers. We do not know the exact time at which it is determined what the flowers will be, but we know that it is long before the appearance of the fruit bud, and nothing can be done after that to change the number of hands or fingers, although the size of the individual fruit may be influenced. It is clear, therefore, that in order to produce large bunches we must commence early. The first thing is a thorough preparation of the soil, and the second a generous amount of plant food.

Nitrogen is the food element of which the banana has immediate need for the production of the large leaves and the leaf bases of which the stem is composed. But what is especially needed is potash. According to Professor Hilgard, former Director of the California Experiment Station,* the potash content of banana ash is 63·066 per cent., while the phosphoric acid content is only 1·620 per cent. The ashes of the leaves contain 27·552 per cent. potash, and only 0·638 per cent. phosphoric acid. From the ash analysis, the percentage in the fresh material is calculated to be: fresh fruit 0·68 per cent., and fresh leaves, 0·505 per cent. potash. With a yield of 500 bunches per acre, each bunch weighing 80 lb., equal to 40,000 lb. with a potash content of 0.68 per cent., we have an annual loss of 272 lb. of potash in the fruit alone. Beside that there is a loss of nearly 3 lb. of potash for every 100 lb. of dry leaves removed, which in a great many fields amounts to 1,000 lb., making the total loss of potash for one crop about 300 lb. This would indicate that all we need to do is to apply 600 lb. of sulphate of potash, or 800 lb. for good, measure, and just sit down and wait for the fourteen-hand bunches to appear with every finger as big as a plantain. But that deduction is far from being correct, which was thoroughly shown by the large number of careful experiments conducted by the Hon. H. H. Cousins, now Director of Agriculture in Jamaica.† We may take as an example the experiment at Huntly, Brown's Town, quoted on p. 13 of the Bulletin, where eight plots with manure in different forms and quantities were under observation. Mr. Cousins says:—

"The total phosphoric acid in the soil is high, although the availability is low. The potash is not high. The humus and nitrogen appear to be normal for a good soil. . . . The results from the manures were uniformly bad. No marketable crops were obtained during the year; the bananas apparently failed completely. . . . My opinion is that the manures were not concerned in the results obtained, but that the failure to grow bananas is due to other causes than a deficiency in plant food."

This is evidently the keynote to the failure of fertiliser experiments in general. We know that our plants need certain plant foods. We buy a fertiliser at so much per ton and pay good hard-earned cash for it, and "whistle" for the return of the "siller." But plants are, after all, not much different from people. We may eat roast beef three times a day and not gain enough strength to do a day's work if we sleep in damp, dark, ill-ventilated quarters. We may give the plants all the food they want and the kind we know they need, but we must realise that they are living forms. We must drain the soil if it needs draining, apply lime if it is sour, work it if it is hard—not alone a few inches on the surface, but deep down; not alone in a hole a foot or two in circumference, but the whole field. A field planted with bananas 9 ft. by 9 ft. or 10 ft. by 10 ft. should have the feeding roots extending all through it. We must not carry off the trash unless we practice rotation and supply other vegetable matter to the soil, because without that no amount of work will keep it porous and no amount of fertiliser will produce a crop. We must not forget the water. Plant roots absorb food in a very dilute watery solution. The water is given off by the leaves through transpiration and a constant movement of food is kept up. This movement, which results in growth, is naturally very rapid in the banana because of the large leaf surface, therefore, unless there is an abundant and constant water supply the food is not absorbed and the growth is retarded.

In the heavy clay soils of Porto Rico bananas are greatly benefited by mineral manures, and under favourable conditions most banana soils in the West Indies would respond to a manure containing per acre 200 lb. sulphate of potash, 250 lb. sulphate of ammonia, 450 lb. acid phosphate.

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* "Report Agricultural Export Station, California," 1902-3, p. 277.

† *Bulletin Department of Agriculture*, January, vol. i., part 1, 1903.

General Notes.

QUEENSLAND FELIX.

If the rest of the world only knew what a bright, happy State this is, how glorious our climate, how fertile our fields, and how diversified our products, Queensland would be so packed with home-seekers that there would not be a spot to loaf on. Home-seekers are what we want, and we are glad to welcome them. We don't want lazy adventurers who cannot make a success of life anywhere, but the hard-working farmer with a little capital, the hard-working farm labourer with his strength and his brains for his capital. These are what we want to build up our State, and it is pleasant to know that they are coming to us in increasing numbers.

THE BUTTERMAN.

We've reached another stage of life,
  When failing years are born anew;
This lovely year has seen no strife,
  And peacefully departs from view.
A sunny summer filled with fruit,
  An autumn crowned with golden lore,
A richer year beyond dispute
  Than many that have gone before.
Bountiful year, adieu, farewell,
  Go home and tell your Father how
We thank Him more than tongue can tell,
  And pray Him still, "God speed the plough."
To patrons, readers, far and near,
  And dairymaids throughout the lan',
We wish you all a bright New Year,
  Most truly yours, "The Butterman."

LEECH IN A DOG'S NOSE.

There are one or two effective ways of extracting a leech from a dog's nostril. One is to inject vinegar or a solution of salt. This will make the dog sneeze, and so eject the intruder. A good pinch of snuff will have the same effect. Another method is to keep the dog in the hot sun for a short time, then bring him into a cool room and dip his nose in a vessel of cool water, and with a handkerchief adjusted between the finger and thumb you can grasp the leech firmly and he has to come out.

Answers to Correspondents.

A WATCH AS A COMPASS

EXPLORER, Geraldton.—

Hold your watch so that the figure twelve points to the sun. Look where the hour hand is. The north will be just half-way between.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	NOVEMBER. Prices.
Apples (American), per case	19s to 26s.
Apples (Hobart), per case	...
Apples (Victorian), per case	...
Apples (Cooking), per case	7s. to 8s.
Apricots, per quarter-case	1s. 6d. to 4s. 6d.
Bananas (Cavendish), per dozen	1d. to 1½d.
Bananas (Sugar), per dozen	2d. to 2½d.
Cape Gooseberries, per quarter-case	...
Cherries, per quarter-case	3s. 6d. to 6s.
Custard Apples, per quarter-case	...
Lemons (Lisbon), per case	14s. 6d. to 15s.
Lemons (Sydney), per case	...
Mandarins, per quarter-case	...
Mangoes, per case	2s. 6d. to 6s.
Oranges, per case	7s. to 10s. 6d.
Papaw Apples, per quarter-case	1s. 3d. to 1s. 9d.
Passion Fruit, per quarter-case	1s. 3d. to 2s.
Peaches, per quarter-case	1s. 3d. to 1s. 6d.
Pineapples (Ripley Queen), per dozen	1s. 6d. to 2s. 6d.
Pineapples (Rough), per dozen	6d. to 2s. 6d.
Pineapples (Queen), per dozen	4s. 3d. to 6s.
Plums, per quarter-case	3s. to 4s.
Rock melons, per dozen	6d. to 2s.
Tomatoes, per quarter-case	1s. to 2s. 6d.
Water melons, per dozen	1s. 6d. to 6s.

SOUTHERN FRUIT MARKET.

Apples (American Eating), per case	16s. to 18s.
Apples (Hobart), per case	8s. to 12s.
Apples (Cooking), per case	6s. to 9s.
Apricots, per quarter-case	5s. to 9s.
Bananas (Cavendish), per case	11s. to 12s.
Bananas (Sugar), per bunch	2s. 6d. to 4s. 6d.
Cherries, per quarter-case	3s. to 5s.
Cocoanuts, per dozen	1s. 9d. to 2s. 6d.
Gooseberries, per half-bushel case	4s. to 6s.
Grapes (Queensland), per 12 lb. box	4s. to 5s.
Lemons (Local), per case	7s. to 8s.
Lemons (Italian), per case	13s. to 14s.
Mandarins (Emperor), per case	5s. to 9s.
Mandarins (Medium), per case	...
Oranges (Local), per case	9s. to 16s.
Oranges (Navel), per case	16s. to 18s.
Passion Fruit (Choice), per half-case	9s. to 10s.
Peaches, per half-case	4s. 6d. to 10s.
Peanuts, per lb.	5½d.
Pears (Choice), per packer	...
Pears (Medium), Choice, per packer	...
Persimmons, per box	...
Pineapples (Queensland), Ripley Queen, per case	8s. to 9s. 6d.
Pineapples (Queensland), Choice, Common, per case	8s. to 9s. 6d.
Pineapples (Queensland), Choice, Queen, per case	9s. to 10s.
Plums, per half-case	3s. to 4s. 6d.
Strawberries (Queensland), per dozen quart punnets	6s. to 12s.
Tomatoes (Queensland), per quarter-case	4s. to 6s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR DECEMBER.

Article.		DECEMBER. Prices.
Bacon, Pineapple	lb.	8d. to 9½d.
Barley, Malting	bush.	2s. 6d. to 3s. 6d.
Bran	ton	£5 to £5 10s.
Butter, Factory	cwt.	7¼d. to 8d.
Chaff, Mixed	ton	£3 15s. to £4 10s.
Chaff, Oaten	,,	£5 to £5
Chaff, Lucerne	,,	£3 5s. to £4 10s.
Chaff, Wheaten	,,	£2 to £2 10s.
Cheese	lb.	5½d. to 9d.
Flour	ton	...
Hay, Oaten	,,	£5 10s.
Hay, Lucerne	,,	£3 to £3 15s.
Honey	lb.	2d. to 2¼d.
Maize	bush.	3s. 10d.
Oats	,,	3s. 2d. to 3s. 4d.
Pollard	ton	£5 10s.
Potatoes	,,	£4 to £9 10s.
Potatoes, Sweet	,,	...
Pumpkins	,,	£4 5s. to £4 10s.
Wheat, Milling	bush.	4s. 4d. to 4s. 6d.
Wheat, Chick	,,	...
Onions	ton	£8
Hams	lb.	1s. to 1s. 1½d.
Eggs	doz.	8d. to 1s. 2d.
Fowls	pair	3s.; male, 4s. 3d. to 5s. 3d.
Geese	,,	6s. 6d. to 7s.
Ducks, English	,,	3s. 6d. to 4s. 3d.
Ducks, Muscovy	,,	4s. 6d. to 5s. 3d.
Turkeys (Hens)	,,	7s. 6d. to 9s. 6d.
Turkeys (Gobblers)	,,	17s. 6d. to 20s.

ENOGGERA SALEYARDS.

Animal.	NOVEMBER. Prices.
Bullocks	£8 2s. 6d. to £11.
,, (single)	£11 5s.
Cows	£6 to £7 2s. 6d.
,, (single)	£9.
Merino Wethers (Woolly)	16s.
Crossbred Wethers	17s.
Merino Ewes	13s. 3d.
Crossbred Ewes	14s.
Lambs	12s. 6d.
Pigs (Bacon)	51s.
,, (Porkers)	26s.
,, (Slips)	10s.

Orchard Notes for February.

By ALBERT H. BENSON, M.R.A.C.

In order that the series of monthly notes that have appeared for some years past in the "Agricultural Journal" might be rendered of more value to our fruit-growers, I took advantage of the commencement of the new year of 1908 to revise them and bring them up to date. At the same time I somewhat altered the notes, as, instead of making them of a general nature, applicable to the whole of the State, I endeavoured to localise them to a certain extent, as, in my opinion, although the general principles of cultivation, manuring, pruning, treatment of fruit pests, as well as of the handling and marketing of the fruit are applicable to the State as a whole, there are many matters that are of interest to individual parts of the State rather than to the whole State; and, further, notes that are applicable to the Southern part of the State for one month are not always applicable to the North for the same month.

In order to carry out this idea, I divided the State as follows:—

1. The Southern Coast Districts, south of the Tropic of Capricorn;
2. The Tropical Coast Districts;
3. The Southern and Central Tablelands.

This plan has met with such general approval during the past year that the notes will henceforth be published in accordance therewith.

THE SOUTHERN COAST DISTRICTS.

The earlier summer fruits, including grapes, will be pretty well over, but pineapples, mangoes, and bananas are in full fruit. The bulk of the main summer crop of pines ripens during the month, and growers are in consequence kept very busy sending them to both our local markets and canneries, and to the Southern States. The planting of all kinds of tropical fruits can be continued where necessary, though earlier planting of both pines and bananas is to be recommended. Still, if the land is thoroughly prepared—viz., well and deeply worked—they can be planted with safety, and will become well established before winter. The month is usually a wet one, and both tree and weed growth is excessive. If unable to get on the land with horses to keep down weed growth, use the scythe freely in the orchard before weeds seed, as by doing so you will form a good mulch that will tend to prevent the soil washing, and that when ploughed in later will add a considerable quantity of organic matter to the soil, thus tending to improve its mechanical condition, its power of absorbing and retaining moisture, as well as to increase its nitrogen contents.

This is the best month of the year in which to bud mangoes in the Brisbane district. The bark of the stock to be budded must run very freely, and the scion when placed in position must be tied very firmly. The bark of the scion should be slightly thicker than the bark of the stock, so that the material used to tie it keeps it firmly in its place. As soon as the bud is tied ringbark the stock just above the bud, so as to force the sap of the stock into the scion, so that a union will take place quickly.

Where cyaniding of citrus and other trees has not been concluded it may be continued during the month, as fruit treated now will probably keep clean and free from scale insects till gathered. If the trees have been treated with Bordeaux mixture, do not cyanide, as cyaniding should always be done previous to spraying with Bordeaux mixture.

If Maori is showing, spray with the sulphide of soda wash. Look out for Black Brand and also for the Yellow Peach Moth towards the end of the month in the earlier districts. Spraying with Bordeaux mixture is advisable in the case of both of these pests.

Get land ready for strawberry planting, so as to be ready to set out runners next month. Some growers set out plants as early as the end of February, but I prefer March. Citrus and deciduous trees can still be budded during the month. Young trees in nursery should be kept clean and attended to; ties should be cut where necessary, and the young trees trained to a straight single stem.

THE TROPICAL COAST DISTRICTS.

As the month is usually a very wet one in this part of the State, very little work can be done in the orchard other than keeping down excessive weed growth by means of a scythe. Where citrus trees are making excessive growth and throwing out large numbers of water-shoots, the latter should be cut away, otherwise they are apt to rob the rest of the tree, and thus injure it considerably. Many of the citrus trees will come into a second blossoming during the month, and this will produce a crop of fruit ripening towards the end of winter and during the following spring. The main crop, where same has set in spring, will be ripening towards the end of the month, but, as a rule, insect life of all kinds is so prevalent at this time of the year that the bulk of the fruit is destroyed. Where there is sound fruit, however, it will pay to look after. If the weather is wet it should be artificially dried before packing, but if there are periods of sunshine, then the fruit can be cut and laid out on boards or slabs in the sun, so that the extra moisture of the skin can be dried out. Care will have to be taken not to sun-scald the fruit or to dry it too much; all that is required is to evaporate the surplus moisture from the skin, so that the fruit will not speck when packed.

Tropical fruits of all sorts can be planted during the month Budding of mangoes and other fruits can be continued. Bananas must be kept netted, as fly is always bad at this time of year.

SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of apples, pears, plums, peaches, and nectarines will occupy the attention of the Stanthorpe growers. The grape harvest will also extend right through the month. Every care should be taken to see that the fruit fly and codling moth are not allowed to spread, although the best work in fighting these pests has to be done during the months of December and January, as on the action then taken, if carried out systematically, the freedom of the later fruits from infestation mainly depends.

Handle the fruit carefully, and see that no fly or codling moth infested fruit leaves the district. The grapes, ripening as they do when this fruit is over in the earlier parts of the State, should be sent not only to Brisbane but to all other parts of the State. For long shipments nothing can beat crates holding six 6-lb. baskets. The fruit should be gathered some hours before packing, and be placed in the sun, so as to become thoroughly dry, and to allow the stems to become wilted, as this causes the fruit to hang on the bunch much better, and consequently to reach its desination in better order.

If parrots and flying foxes are troublesome, organised shooting parties or poisoning with strychnine are the best means of dealing with these pests.

The crop of grapes will be about over in the Roma and other inland districts. Citrus trees, when infested by Red Scale, should be cyanided. The orchard should be kept well cultivated after every rain, and when there is no rain, but water is available for irrigation, if the soil requires it, the trees should get a good soaking, which, if followed by thorough cultivation, will carry the trees on till the fruit is ripe.

Farm and Garden Notes for February.

FIELD.—The land intended for potatoes should now be ready for planting. Plant sound small potatoes, well shot, without cutting them. If large potatoes are cut into setts, there is a risk of their rotting, as the usual wet weather may be expected, with a hot, muggy atmosphere. Weeds will be very troublesome, and for that reason the sowing of lucerne should be deferred till later. Sow lucerne in deep rich soil, thoroughly worked, and deeply ploughed. Cape barley, panicum, Kafir corn, imphee, sorghum, and vetches may be sown, but it is risky to plant maize for a late crop, as early frosts would destroy the ripening grain. For an early winter crop, sow swede turnips and mangel wurtzels.

KITCHEN GARDEN.—Make preparations for good crops of vegetables for the early winter by ploughing or digging all unoccupied land, supplying well-rotted manure if needed. Chicken guano is also an excellent fertiliser, if prepared as follows:—

Spread a layer of black soil on the ground. Dump the fowl manure on to this, and pound it fine with the back of a spade; add hardwood ashes, so that the compound shall contain—Soil, 3 bushels; fowl manure, 2 bushels; ashes, 1 bushels. Mix thoroughly, and a little before planting moisten the heap with water, or, better still, with urine; cover with old mats, and let it lie till needed.

Most market gardeners will have cabbages and cauliflowers ready for transplanting. Do this during the month. Read the article in the pamphlet on "Market Gardening," issued by this Department, on the growing of cabbages and cauliflowers, in which it is recommended to sow the seed from the middle of January to the middle of March, arranging the time, however, to suit early and late districts. For winter crops, the Drumhead type, of which Flat Dutch and Queensland or Florida Headen are good examples, are the most profitable. The Savoy cabbage does well here. The best cauliflowers to grow are the Large Asiatic, Eclipse, Early Dwarf, and Le Normand. If the aphis appears, spray with tobacco solution.

Sow French beans, butter beans, beet, carrot, turnip, radish, cabbage, cauliflower, cress, peas. Should the weather prove dry after the January rains, give the plants a good soaking with water. Gather all fruit of cucumbers, melons, French and other beans, and tomatoes as they ripen, to ensure the continued production of the vines and plants.

FLOWER GARDEN.—Thin out, and tie up dahlias. Keep the weeds down, and never allow them to seed. Sow hardy annuals. This is the best month for sowing, as you will be able to keep up a succession of bloom during the succeeding months of autumn and winter. To ensure this, sow phlox, pansy, daisy, stocks, aster, nasturtium, hollyhock, candytuft, mignonette, sweet peas, dianthus, carnations, cornflower, summer chrysanthemum, verbenas, petunias, pentstemons, &c. Dianthus, sown now and planted out in March, will bloom during the whole year, if the dead stalks and blooms are regularly cut away.

Do not sow flower seeds too deep, as on the depth will depend greatly what results you will have as regards the seed germinating. It is easy to remember that seeds should be covered with fine soil to a depth equal to their own size—for instance, a pea is about one-eighth of an inch in diameter, therefore, cover it with one-eighth of an inch of soil.

An exhaustive booklet on "Flower Gardening for Amateurs" has just been issued by the Department of Agriculture and Stock, and may be obtained from the office on application.

Times of Sunrise and Sunset at Brisbane, 1910.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·56	6·46	5·21	6·42	5·41	6·20	5·57	5·47
2	4·57	6·46	5·21	6·42	5·41	6·19	5·58	5·46
3	4·58	6·46	5·22	6·41	5·42	6·18	5·58	5·45
4	4·59	6·46	5·23	6·41	5·42	6·17	5·59	5·43
5	4·59	6·46	5·24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·24	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·39	5·44	6·14	6·0	5·40
8	5·1	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5·3	6·47	5·28	6·37	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·36
12	5·4	6·47	5·29	6·35	5·47	6·9	6·3	5·35
13	5·5	6·47	5·30	6·35	5·47	6·8	6·4	5·34
14	5·6	6·47	5·31	6·34	5·48	6·7	6·4	5·33
15	5·7	6·47	5·31	6·33	5·49	6·6	6·5	5·31
16	5·8	6·47	5·32	6·32	5·49	6·4	6·5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5·29
18	5·9	6·47	5·33	6·30	5·50	6·2	6·6	5·29
19	5·10	6·47	5·34	6·30	5·51	6·1	6·7	5·28
20	5·11	6·47	5·35	6·29	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·13	6·46	5·36	6·27	5·52	5·58	6·8	5·25
23	5·13	6·46	5·37	6·26	5·53	5·57	6·9	5·24
24	5·14	6·45	5·37	6·25	5·53	5·56	6·9	5·23
25	5·15	6·45	5·38	6·24	5·54	5·54	6·10	5·22
26	5·16	6·45	5·39	6·23	5·54	5·53	6·10	5·21
27	5·16	6·44	5·39	6·22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6·21	5·55	5·51	6·11	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6·43	...	...	5·56	5·49	6·12	5·18
31	5·20	6·43	...	...	5·57	5·48	...	...

PHASES OF THE MOON.

			H.	M.	
3 Jan.	☽	Last Quarter	11	27	p.m.
11 „	●	New Moon	9	51	„
18 „	☾	First Quarter	8	21	„
25 „	○	Full Moon	9	51	„
2 Feb.	☽	Last Quarter	9	27	p.m.
10 „	●	New Moon	11	13	a.m.
17 „	☾	First Quarter	4	33	„
24 „	○	Full Moon	1	36	p.m.
4 Mar.	☽	Last Quarter	5	52	p.m.
11 „	●	New Moon	10	12	„
18 „	☾	First Quarter	1	37	„
26 „	○	Full Moon	6	21	a.m.
3 April	☽	Last Quarter	10	48	a.m.
10 „	●	New Moon	7	25	„
17 „	☾	First Quarter	0	4	„
24 „	○	Full Moon	11	23	p.m.

Agriculture.

BORE WATER FOR IRRIGATION.

Whilst artesian bore water has proved an inestimable boom to pastoralists and agriculturists in the Western country of Queensland, yet, as far as the irrigation of agricultural crops with this water is concerned, there are some districts in which, however suitable it may be for stock, the water is too highly charged with alkali to make it advisable to use it too frequently for irrigation. This appears to be borne out by Mr. Kennedy, of Kainga, Winton, who recently applied to this Department for advice as to its use for irrigating lucerne crops. In response to this inquiry, Mr. J. C. Brünnich, Agricultural Chemist, analysed samples of the water, and advised that one-third of a gallon of nitric acid be applied with every 1,000 gallons of bore water, with the object of neutralising the effects of the bore water, and at the same time adding nitrogenous properties to it. The Department supplied the nitric acid, and Mr. Kennedy carried out the experiments with success. He has written that the lucerne, which was irrigated with bore water in which a small percentage of nitric acid was placed, is doing remarkably well. The experiment should be of interest to those with bore waters charged with alkali.

A NEW MACHINE FOR EXTRACTING BANANA FIBRE.

Up to a short time ago, only one machine, a hand one, known as the "Duchemin Machine," has been invented for extracting the fibre of the *Musa textilis* from which the well-known Manila hemp is obtained. It is not generally known that this particular banana is a native of New Guinea, and was first introduced to the Philippines from that island. The scrub land in certain parts of Papua, especially on the Kemp Welch River, abound with this valuable fibre plant, but hitherto nothing has been done with it. We obtained some splendid fibre from some of these plants, on the occasion of our visit to Papua in November, 1909, which was scutched on a Death and Ellwood sisal machine. There is a big business to be done in that territory in banana fibre, but, so far, no machine capable of turning out large quantities daily has been invented. The "Philippine Agricultural Review" of November, 1909, gives a preliminary account of the "Clarke Hemp Machine," which is built in Hongkong by the Philippine Hemp Machine Company, Limited. This machine has lately reached Manila and has been subjected to most satisfactory trials at Palomar Park. It strips a full width of hemp leaf without splitting or "tuxying," which is required by some machines. It will strip hemp up to 11 ft., and after stripping the fibre, twists it into loose rope which makes it convenient for handling. Judging from the trials which were witnessed by officials of the Agricultural Bureau at Manila, it does excellent work. The introduction of such machines, says the "Review," will work a great change in the hemp industry, not only in labour saving, and in reducing the loss of fibre to a minimum, but it will also produce a better grade of fibre, and make the grading of Philippine hemp (Manila fibre) an easy matter, which will have much to do with improving the standard and increasing the demand for Manila hemp in American and European markets.

In due course, we shall receive full particulars concerning the Clarke machine, its cost, capacity, necessary horse-power, &c., which will be published in the Journal for the benefit of growers of cultivated bananas, and of those who hold land on which the wild banana is plentiful.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF DECEMBER, 1909.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Careless ...	Jersey	27 Sept., 1909	925	4·5	46·78*	
Whitefoot ...	Holstein-Shorth'n	2 Oct. ,,	1,005	4·1	46·10	
Cocoa ...	Jersey	12 Sept. ,,	891	4·5	45·70	
Lark ...	Ayrshire ...	14 Aug. ,,	921	4·0	41·16	
Auntie ...	,, ...	23 Aug. ,,	882	4·1	40·46	
Conceit ...	,, ...	22 Nov. ,,	923	3·9	40·17	
Rhoda ...	Grade Shorthorn	4 Aug. ,,	922	3·9	40·12	
Peewee ...	Holstein-Shorth'n	29 Aug. ,,	867	4·1	39·77	
Lady Kelso	Shorthorn... ...	19 Nov. ,,	960	3·7	39·56	
Patch ...	,, ...	29 Nov. ,,	928	3·6	39·52	
Dora ...	,, ...	29 Nov. ,,	989	3·6	37·12	
Comet ...	Holstein	14 Nov. ,,	905	3·5	35·13	
Chocolate ...	Shorthorn	15 June ,,	772	4·2	34·32	
Eve ...	Jersey	1 Nov. ,,	747	4·1	34·26	
Lavina's Pride	Ayrshire ...	9 Nov. ,,	723	4·2	34·02	First calf
Ethel ...	Grade Holstein ...	8 Sept. ,,	848	3·6	33·92	
Honeycombe	Shorthorn... ...	11 April ,,	704	4·2	33·12	
Lass ...	Ayrshire	15 June ,,	703	4·2	33·08	
Dot ...	Shorthorn ...	1 Nov. ,,	788	3·7	32·43	
Bliss ...	Jersey	5 Oct. ,,	684	4·2	32·17	
Dewdrop ...	Holstein	11 Nov. ,,	849	3·4	31·94	
Redrose ...	Shorthorn... ...	21 Sept. ,,	737	3·8	31·20	First calf
Winnie ...	,, ...	2 June ,,	733	3·8	31·03	
Grace ...	,, ...	17 Aug. ,,	775	3·6	31·00	
Restive ...	,, ...	30 Oct. ,,	769	3·6	30·76	
Night ...	Grade Holstein ...	23 Sept. ,,	722	3·7	29·72	
Laura ...	Ayrshire	17 Oct. ,,	680	3·9	29·59	
Helen ...	,, ...	8 Aug. ,,	622	4·2	29·26	First calf
Md. Melba...	Holstein	8 Sept. ,,	701	3·7	28·86	First calf
Tiny ...	Jersey	15 Sept. ,,	592	4·2	28·84	
Stranger ...	Grade Shorthorn	12 Oct. ,,	695	3·7	27·60	
Reamie ...	Ayrshire	7 July ,,	669	3·7	27·54	

* Grazed on cultivation paddocks and natural pasture.

This yield is a remarkably good one, showing an average yield of 34·88 lb. of commercial butter per head.

FEEDING THE CALF.

The most serious stumbling block to the old-time Queensland dairymen was the common practice of doing business "on halves" with a herd of calves. So long as the practice prevailed of milking cows once a day, or three or four times a week, as it happened to be possible to find the cows in the bush, giving the calves free license of their dams for the remainder of the time, substantial improvement in feeding, and in the quality of the cows, or in the products of the dairy, was impossible. It never has paid, and never will pay to feed better, or to get better stock under this barbarous system, and a uniformly good article of butter and cheese is clearly impossible with cows thus treated. In the first place, the dairyman cannot afford to raise calves which, when brought to the condition of three-year-old bullocks, are worth no more than £3 to £4 each. The dairy business must needs be very good to support this kind of wasted effort, and if the dairy will not support unprofitable beef-making, if the grass cannot be more profitably fed to dairy stock,

then dairying had better be abandoned outright for beef-making. In the case of mixed dairy herds, the only calves that the dairyman can afford to raise are the heifer calves, the progeny of good milk stock, which promise to be superior milkers. Such calves, and such only, will pay the dairyman for the care, labour, and milk involved in rearing them.

There is, of course, no calf food that compares in value to fresh milk. Calf-raising, however, being secondary to the main business of dairying, the dairyman must aim to rear his young stock with the least possible cost in those elements of milk which are valuable to him as such. He must, therefore, feed his calves skim milk, to which heat has been restored artificially, and he must return to the skim milk for the calf the fat which has been removed in the shape of butter.

To begin with, the calf had better be removed from the cow soon after it is a couple of days old. Some prefer to take the calf from its dam as soon as it is calved. It is then easily taught to drink from the bucket, and much of the worry and excitement to the cow of parting from its offspring is avoided. In any event, the calf should receive the full milk of the cow, or so much of it as it requires, for the first week of its life. After this, there may be a gradual substitution of skim milk—always warm—for the full milk. At the same time, such additions should be made to the skim milk as will tend to compensate for the absence of butter fat in it. For this purpose, there is nothing better than flax seed, boiled to a jelly in six times its bulk of water. Ordinarily, a daily feed of ½ lb. to 1½ lb. of flax seed, according to the size of the calf, will be a sufficient daily ration.

In Queensland, where flax seed is not generally available, the pollard, or fine middlings of the miller, ground oats, or even maizemeal boiled to the condition of a thick pudding or porridge, are excellent for the purpose named. Many excellent, well-grown calves have been reared upon an even scant supply of skim milk, to which a double handful of boiled maizemeal has been added at each feed. When skim milk is abundant, excellent calves may be reared on it alone; but, as it is nearly always the case that skim milk is in short supply, considering the demand, then it is that the grain addition to the daily feed is made to great advantage. In warm weather particularly, skim milk calves are often troubled with indigestion and resultant diarrhœa. In this case warm milk, in which a few pints of coarse wheat flour or fine middlings have been stirred, fed for a couple of days, will usually prove a correction.

Withal, let the calf have a free run in a small grass paddock, so that it may quickly learn to eat the natural herbage. As its appetite and capacity for grass increase, the milk, and finally the grain, may be diminished, so that by the time that it is six months old, it may be entirely cut off from milk, but grain in some form ought to be continued for some months longer.

The main things to be considered in this old-fashioned method of hand-rearing calves, is to feed regularly twice daily, giving milk blood-warm always, and to carefully avoid sudden transitions from one fare to another. Calves that are thus hand-reared have, to the dairyman, the important advantage—they are accustomed to the care and handling of man from the first, and thus grow up tractable and easily broken-in milch cows. By the use of hand-reared calves, the barbarous leg-rope and bail will ultimately be entirely banished from the Queensland dairyman's milking shed.

EXTRA FEED FOR DAIRY COWS.

In Queensland there is no question connected with the general subject of dairying that equals in importance and practical interest that suggested by the above heading. Here the chief food supply of dairy stock all the year round is, and must be, for an indefinite period, the indigenous grasses of the country, and these grasses, as practical men know, vary greatly as to

nutritive values in different sections and in different seasons of every district. All our efforts at ration-making for dairy cows must aim at supplementing the natural grass supply with such artificial foods as will tend to correct their deficiencies. Our difficulties in attempting this are twofold—we are, to a great extent, despite exhaustive analyses made of many of our best forage grasses by our agricultural chemist, of the particular value of particular grasses at different seasons, and the range of cheap artificial foods is extremely limited, but maize, lucerne, mangolds, and many other fodders are to-day fairly plentiful, whilst the silo gives us abundance of most valuable food in the shape of ensilage. As far as the artificial foods so much in use in European dairying countries, the by-products of manufacturing establishments, are concerned, these are largely wanting in Queensland, hence the supplementing process is generally accomplished by concentrated foods rich in protein. Maize is the grain that generally, throughout the State, is looked to for this purpose, but maize is an expensive food, and is generally, therefore, out of the question. Moreover, maize is not rich in protein, and so must be fed with some green fodder like lucerne or cowpeas, which will correct this deficiency in maize. When the cotton industry is once more fully established in Queensland, as appears likely to be the case, and oil mills are in operation, then we shall have an abundance of a fairly cheap and valuable food in the shape of oil-cake, the great value of which has long since been amply demonstrated. With all our efforts, however, at securing the best of foods, our labours will be largely in vain unless we have the cow that will make the best use of the food supplied to her. Every dairyman knows that two cows will, upon feed equal as to quantity and quality, give entirely different results in milk, cream, and butter. An American writer puts it in this way:—"It is the old story; the best tools do the best work, no matter whether it is a plough, a saw, a mower, or a cow. So many of us are careful to select the best ploughs, &c., examining different kinds to find out which has the most good qualities; but when it comes to cows, we are not so particular, but go on the principle that a cow is a cow, when the fact is, there is a vastly greater difference in the quality of cows than there is of ploughs. Any modern plough will do good work if properly handled, but many modern cows are incapable of being made to do good work."

When the American wrote this, he was writing in the days of the dawn of the dairying industry. The Queensland dairy farmer is to-day as particular about his breed of cows as about anything else on his farm, and he does not hesitate to pay a high price for cows and bulls of well-known pedigree. At that remote time, the average annual yield of Queensland dairy herds was somewhat between 50 and 80 lb. of butter. To-day we have cows yielding, during their milking period, from 200 to 500 lb. of commercial butter, and 300,000 dairy cows in 1908 yielded 29,000,000 lb. of butter and 13,000,000 lb. of cheese. This is considerably over an average of 95 lb. of butter per cow, whilst in really good dairy herds the annual yield has been as above stated. This speaks volumes for the improvement which has taken place in the class of dairy cattle, in their feeding, and general treatment since 1891. No one in his senses will believe that if the daily feed of all Queensland cows were raised to the high standard of the really good herds, the former's productiveness would be brought up to the standard of the latter. But far in advance of feeding and foods in importance to the Queensland dairyman is the question of better food-consuming machines—better cows. The use, or rather, the waste, of valuable foods on the riff-raff of dairy cows, which some slow-to-convince dairymen persist in retaining, may possibly open their eyes to the fact that good feed can only be profitably fed to good animals. It is frequently said that it is possible, by feed alone, to increase the fat per centage of milk. After hundreds of trials, it has been shown that, as a rule, this idea is a fallacy. There may be, and doubtless is, here and there a cow so endowed by Nature that abundant and highly stimulating foods will increase the proportion of butter fat in her milk, but the great bulk of even

the best dairy cows are not so affected. This, however, is certain—we may by better feeding and treatment get an increased and better sustained flow of milk, and thus obtain a better yield of both butter and cheese. We may feed our dairy stock, and get, in return, milk and butter, and for the same feed we may obtain beef, or increased muscular activity or gristle. It all really depends on the sort of stock that consumes the feed.

POINTS OF DAIRY CATTLE—AYRSHIRE CATTLE.

P. B. GORDON.

There is a marked discrepancy between the scale of points of the Ayrshire Agriucltural Association and those favoured in Canada. In a scale received from that country, points that are regarded as fancy or "Showyard" points, are assessed much lower than those of the Ayrshire scale; while those of a more practical nature, principally included in the hind-quarter group of the animal, are valued much higher. Mr. Alexander Bruce—whose diagram I have copied for this paper—arranged his scale of points largely in accordance with those of the Ayrshire Agricultural Association. But, as he adds to his scale two points, "pedigree" and "offspring," to which he allots 16 out of 100 marks, the remaining 84 leaves too meagre a margin for a proper and equitable distribution over the many minor points. These two points are, however, of very great importance in the breeding of a dairy herd, and no scale would be complete that did not include them; particularly "pedigree," seeing that the milking properties are inherited, so that the question of heredity should weigh even more with breeders in selecting bulls and untried heifers than mere outword conformation. I have, therefore, as in the case of beef cattle, adopted 250 as the aggregate number of marks of a standard animal of the breed. The first eight points cannot, of course, be shown by diagram.

COWS AND HEIFERS.

DESCRIPTION OF POINTS AND THEIR VALUES.

1. "Pedigree."—According to standing in Herd Book, or as proved by certificates and declarations—20 points.

2. "Offspring."—The offspring as shown by their success at shows, or the success of their sires and dams at the dairy—20 points.

3. "Style and Character."—The general appearance, including style, character, and movement, should indicate purity of blood and high breeding, the whole figure being at the same time compact and well proportioned—10 points.

4. "Size."—The average live weight (in full milk) should be about 10½ cwt.—5 points.

5. "Colour."—May be of any shade, brown or white, or a mixture of these, each colour being distinctly defined; brindle or black and white are not in favour—6 points.

6. "Bone."—Fine and clean under the knee—4 points.

7. "Hair."—Soft, close, and woolly—3 points.

8. "Handle."—Skin soft and elastic—7 points.

9. "Horns."—Horn large but not coarse, clear, wide set, and inclining upwards—3 points.

10. "Ears."—Rather large and lively—2 points.

11. "Head and Face."—Head short, and forehead wide; face clean cut —5 points.

12. "Eye and Expression."—Eye full and lively; expression quiet and gentle—5 points.

13. "Nose and Nostril."—Fine between eyes and muzzle; nostrils wide —2 points.

14. "Muzzle."—Large and lustrous—3 points.

15. "Neck."—Moderately long and straight from the head to the top of the shoulder, free from loose skin on the underside, fine at its juncture with the head, and enlarging symmetrically towards the shoulders—5 points.

16. "Breast."—Light, but sufficiently broad to ensure constitution—3 points.

17. "Brisket."—Small, and the whole forequarter light—2 points.

18. "Crops or Withers."—Fine—5 points.

19. "Shoulder."—Sloping, and fairly covered with muscle—3 points.

20. "Forearm."—Rather large, straight, and muscular—2 points.

21. "Chine."—Fine, but symmetrical, and well defined—3 points.

22. "Foreribs."—Gradually increasing in depth and width backwards, and standing well out from the spine—4 points.

23. "Foreflank and Chest."—Deep, and running evenly into the shoulder —3 points.

24. "Back."—Short and straight, and on the same level as the chine and loin—4 points.

25. "Back ribs."—Arched, and running well back to the hindquarters —4 points.

26. "Belly."—Capacious—2 points.

27. "Loin."—Broad, level, and long—7 points.

28. "Flank."—Well let down—3 points.

29. "Hips."—Hip, or hook bones, should be wide apart, and not covered with fat—3 points.

30. "Rump."—Long, broad, and straight—5 points.

31. "Tail and Set-on."—Long, slender, set on level with the back, and not running up the rump—2 points.

32. "Quarter."—Large and wide across behind—4 points.

33. "Thigh."—The thigh thin, deep, and broad, concave rather than convex—6 points.

34. "Twist."—The space between the hind legs running well up, wide, and roomy—6 points.

35. "Mirror and Escutcheon."—Large and well defined, the higher the mirror the better—4 points.

36. "Udder."—Capacious and not fleshy, but elastic, hinder part broad, and firmly attached to the body; the sole nearly level, and extending well forward—40 points.

37. "Teats."—From 2½ to 3 inches in length, equal in thickness, hanging perpendicularly; distances apart at sides equal to third of vessel, and across to about one-half of the breadth—10 points.

38. "Milk Veins."—About udder and abdomen well developed—15 points.

39. "Knee" clean and firm, and fairly developed—1 point.

40. "Gambril," or "Hock."—Clean, firm, long, and broad, and nearly straight to the ground—3 points.

41. "Legs."—Short in proportion to the size, straight, and clean; hind legs well apart—4 points.

42. "Hoof" clean, short, and well proportioned—2 points.

Abstract.

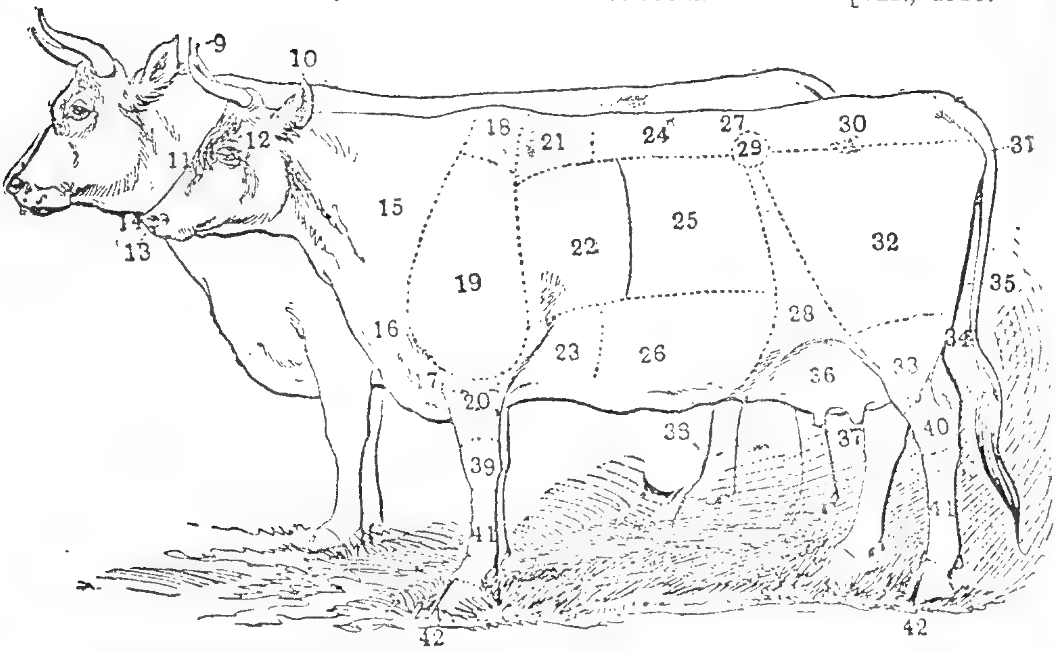
	Points.		Points.
First Group, Pedigree, &c.—		Sixth or Middle Group—	
Pedigree	20	Back	4
Offspring	20	Back ribs	4
		Belly	2
Second Group, Style, &c.—		Loin	7
Style and character ...	10	Flank	3
Third Group, Size, &c.—			
Size	5		
Fourth Group, Quality—		Seventh Group, Hindquarter—	
Colour	6	Hips	3
Hair	3	Rump	5
Bone	4	Tail	2
Handle	7	Quarter	4
Horns	3	Thigh	6
Ears	2	Twist	6
Head and face	5	Mirror and escutcheon ...	4
Eye and expression ...	5	Udder	40
Nose and nostril	2	Teats	10
Muzzle	3	Milk veins	15
Fifth Group, Forequarter—			
Neck	5		
Breast	3		
Brisket	2	Eighth Group, Legs, &c.—	
Crops or withers	5	Knee	1
Shoulder	3	Gambril	3
Forearm	2	Legs	4
Chine	3	Hoofs	2
Foreribs	4		
Fore flank and chest ...	3	Aggregate	250

BULL (3 YEARS AND OVER).

The points and their values in bulls are the same as those in cows, with the following points of difference:—

In the Bull—

No. 3, Style and Character, is allotted 20 marks.
„ 15, Neck.—9 points.
„ 18, Crops.—12 points.
„ 19, Shoulder.—4 points.
„ 20, Forearms.—4 points.
„ 24, Back.—5 points.
„ 26, Back ribs.—6 points.
„ 29, Hips.—4 points.
„ 30, Rump.—7 points.
„ 31, Tail.—4 points.
„ 32, Quarter.—9 points.
„ 33, Thigh.—6 points.
„ 35, Mirror and escutcheon.—5 points.
„ 36, Testes (which should be large and white colour).—5 points; and
„ 37, Teats.—15 in the bull instead of 10 in the cow.



The above plate represents an Ayrshire bull and cow, with the points approximately indicated on the plate of the cow, the numbers appearing on it corresponding with those given in the preceding pages in describing the points and setting out their relative values.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1908.	1909.											
	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
North.													
Bowen	0·42	15·48	4·52	1·06	1·15	2·32	1·98	1·23	0·13	0·21	0·36	3·15	19·98
Cairns	1·41	32·05	5·25	21·03	14·19	1·06	2·48	0·65	2·48	0·7	3·19	7·31	15·24
Geraldton	1·69	47·92	10·29	37·31	28·51	5·98	9·13	6·53	5·32	0·36	6·71	14·57	19·98
Gindie State Farm ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Herberton	0·78	12·41	2·28	3·52	0·70	0·81	1·22	0·20	0·75	0·50	2·30	4·50	5·11
Hughenden	1·05	7·55	1·55	2·86	...	Nil	1·71	1·37	0·33	0·8	1·95	0·54	8·01
Kamerunga State Nurs.	...	...	3·52	...	4·95	0·97	...	...	...	...	...	...	...
Mackay	0·02	15·00	1·36	9·00	2·59	2·33	2·05	4·00	0·75	0·73	2·88	3·18	25·56
Rockhampton	1·37	9·01	2·01	1·68	1·21	0·03	1·33	2·99	1·37	1·20	2·16	4·55	2·74
Townsville	0·07	6·94	1·70	7·01	1·28	1·07	1·51	0·83	0·57	0·12	2·07	1·31	11·51
South.													
Biggenden State Farm	3·66	7·37	2·68	2·45	2·00	0·72	2·60	4·01	1·78	0·29	...	2·83	6·96
Brisbane	1·28	1·99	2·72	2·65	4·67	0·82	1·75	2·10	2·44	2·74	1·56	4·14	6·45
Bundaberg	3·34	6·52	3·70	5·06	1·54	0·67	1·51	5·65	1·66	0·98	0·42	3·55	2·99
Dalby	1·56	1·46	3·55	0·99	1·60	Nil	1·87	1·19	3·13	0·47	1·92	2·13	2·45
Esk	3·62	2·64	3·21	3·27	5·03	0·36	2·43	2·74	3·31	2·60	2·61	2·69	9·20
Gatton Agric. College	1·29	1·94	5·00	3·18	3·82	0·32	1·22	2·02	2·09	2·29	1·87	...	3·92
Gympie	3·97	3·86	3·77	3·41	2·34	1·15	2·96	4·70	2·80	1·70	2·30	3·82	16·54
Ipswich	1·05	1·37	1·95	2·66	4·56	0·05	1·31	1·67	1·34	3·55	1·93	1·56	4·72
Maryborough	1·64	8·36	7·11	2·28	2·4	0·91	2·57	5·02	2·53	1·56	0·51	3.94	6·83
Roma	1·68	5·19	4·85	4·18	1·91	0·44	2·73	1·54	4·83	0·12	0·90	2·12	1·05
Roma State Farm ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tewantin	4·12	6·44	3·31	4·34	9·37	1·00	3·24	4·08	4·24	1·38	3·82	1·90	8·85
Warwick	2·02	0·87	0·82	1·30	2·21	0·70	1·23	2·04	2·28	1·77	2·85	2·77	1·25
Wellington Point ...	...	...	...	...	...	...	...	...	...	...	...	...	9·00
Westbrook State Farm	...	...	2·61	1·43	...	...	...	...	...	...	...	...	...
Yandina	2·75	6·69	6·42	3·71	5·25	1·10	2·70	3·70	5·81	3·84	2·30	0·76	20·18

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

Poultry.

OSTRICH FARMING.

By J. FARQUHAR MESSER.

South Africa is noteworthy in having, among other things, a monopoly in one of the most lucrative farming industries in the world at the present time—namely, that of ostrich raising. For the last forty years farmers have succeeded in domesticating the bird in Cape Colony, and rearing chicks in the tame state. Great strides have been made in the improvement of stock through selective breeding and careful pairing of birds and the introduction of new blood. Inbreeding can be carried on to a great extent, but should be avoided as much as possible.

There are various methods of running birds, chief among them being "ranching," otherwise running the birds on large areas in a semi-wild state, and rounding them up yearly for plucking—average birds ranched should bring in a return of £3 or £4 per annum. This compares very unfavourably with the more up-to-date method of farming the bird on feather-producing fodders, such as lucerne, lucerne hay, rape, barley, peas, and maize—and where birds can be fed regularly and kept in uniform condition, and are always under the eye of the farmer—also, they are more easily managed, and a plucking can be obtained every eight months under the latter conditions. Average birds on lucerne should give a return of from £7 to £10 per annum. Among other foods necessary for the production of good feather are lime, broken bone, pebbles, or gravel. Four to eight birds can be grazed on an acre of lucerne, and where green lucerne is chaffed for them ten to twelve can be run on the same area. In ranching, one bird requires from 15 to 25 acres, according to the condition of the veld.

Climatic conditions have much to do with the production of first-class feathers. Birds thrive better in a warm, dry climate. Under these conditions a farmer is much more likely to meet with success than in districts where there are long wet winters and severe frosts. A spell of cold wet weather will often spoil a whole clip, especially if the feathers are green (young). Continuous wet weather in the breeding season carries off the chicks in a wholesale manner; therefore, a farmer should select a locality where the rainfall does not exceed 30 inches per annum, and that spread. As a result of forty years' accumulated experience, farmers are beginning to understand the necessary conditions under which ostriches thrive best. Often, when birds are moved from one district to another, they go off in condition, and want particular care to bring them up to concert pitch again. Another critical time is immediately after quilling, when the birds should be given an extra ration daily for a few weeks, so as to materially assist the new growth of feathers.

While dealing with condition, a few words about diseases to which ostriches are subject would not be out of place. External parasites are few, and do little harm, if any. On the shaft of the feather is found the ostrich mite. It has no effect on the bird or feather. The ostrich louse and fly irritate the bird, but do no harm. The wire-worm and the tape-worm are the intestinal parasites, and both are liable to decimate a flock unless taken in hand in time. The wire-worm is unknown in Australia, so little mention may be made of it here. The tape-worm, which occurs in chicks and young birds up to the age of eighteen months, can be easily got rid of by dosing with petrol or turpentine. Yellow liver, or fever, occurs in chicks about six weeks

old, and has been known in birds up to the age of eight months. Epsom salts should be given them in their water to drink, care should be taken to keep them warm and dry, and dry foods should be fed them, such as wheat, Kafir corn, &c. After birds reach the age of eighteen months, they become practically immune to disease, and deaths only occur from old age or accident. The life of an ostrich is about thirty-five to forty years.

Chicks can be artificially hatched as well as by natural parental incubation. More eggs can be obtained by taking them away daily from a pair of breeding birds, and transferring them to the incubator; by following this method a much larger percentage of chicks can be obtained. On the other hand, it is possible that forced production of eggs may act detrimentally on the hen and her progeny. Chicks hatched in the early part of the breeding season are invariably stronger and more healthy than those hatched in the summer months. A good pair of breeding birds will hatch three nests of eggs under natural conditions during the year.

Birds kept in good condition can be plucked every eight months. The first clipping takes place at about the age of six months. Two months after the plucking the quills of the cut feathers are drawn. Great care must be taken so as not to injure the socket of the feather, and the farmer must be careful to see that the old quills are ripe before drawing them. When through with the plucking, the feathers are sorted, and are ready for market. Should it be necessary to dip the birds, immediately after the plucking is the best time.

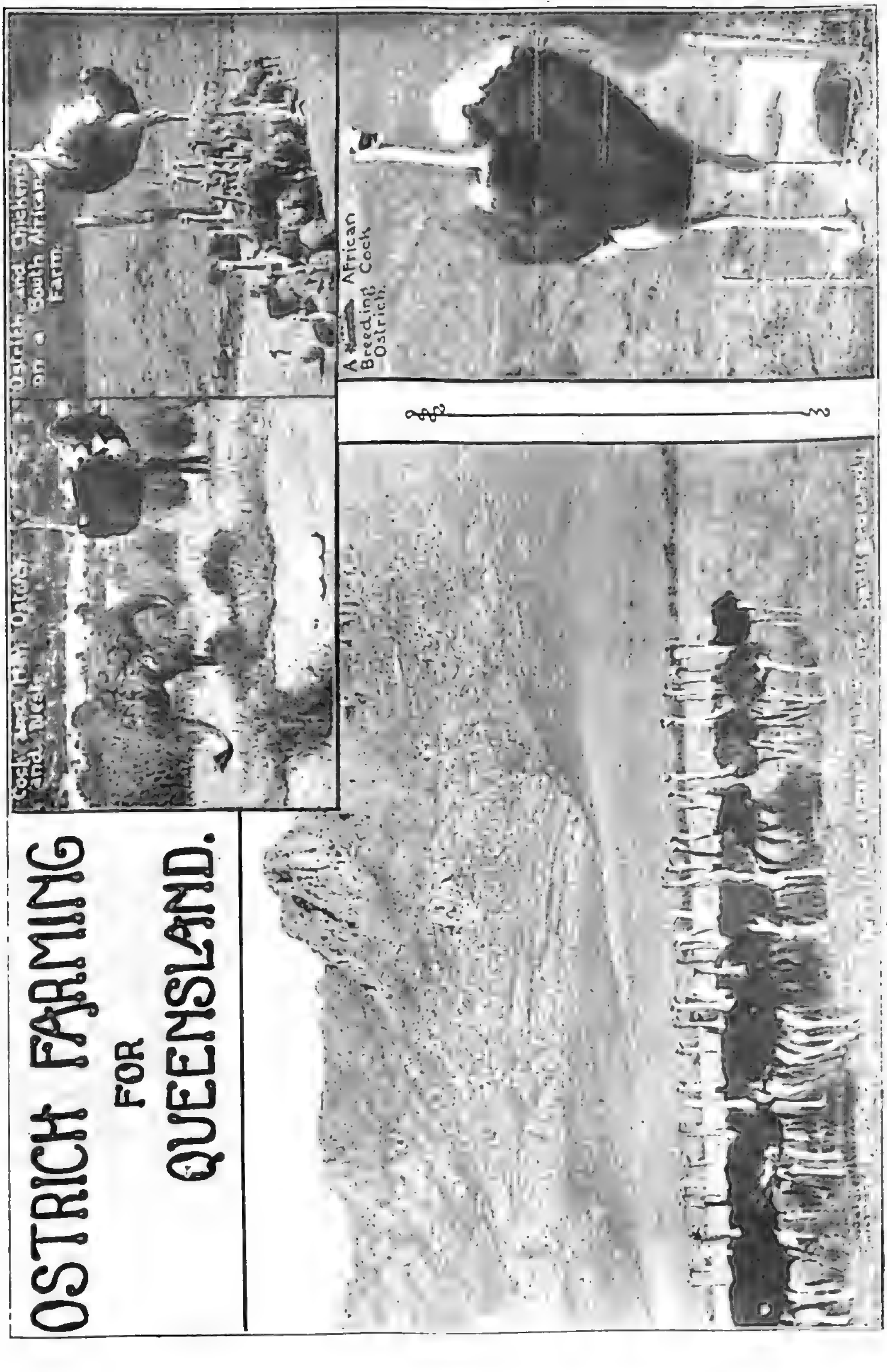
Referring to the financial side of ostrich farming, take, for example, five average feather birds to be grazed continuously on 1 acre of irrigated lucerne, allowing £4 per clip, or £6 per annum per bird. This gives the farmer a gross return of £30 per acre. Working expenses would not be more than £4 per annum, which leaves a net profit of £26. Should the farmer chaff the green lucerne, and not allow the birds to graze, at least ten can be run to the acre, when the net profit would come out at about £50 per acre per annum. I have purposely underestimated the price of the clip, so that the most supercilious critic may be satisfied. Coming now to the increase in chicks, under ordinary circumstances an average breeding pair should produce, after allowing for all losses, fifteen chicks per year under natural incubation (this can be greatly increased by using an incubator), and at the age of six months these birds would probably be worth, if there was a ready sale for them, about £10 each. The breeding pair would be fenced off on a separate acre, and another acre required for the chicks; thus these 2 acres would return, after deducting working expenses, something like £140. Comparing ostriches with sheep, the following statement may be interesting:—

SHEEP.

	£	s.	d.
150 ewes, off shears, at 6s.	45	0	0
1 ram	3	3	0
Expenses droving	1	17	0
	£50	0	0

	£	s.	d.
1 year's wool, at 4s., off 150 ewes	30	0	0
80 per cent. lambs, at 2s. 6d. on 120 lambs, £15; less 20 per cent. loss, £3	12	0	0
150 ewes, at purchase price, 6s.	45	0	0
1 ram ditto	3	3	0
	£90	3	0

Plate II.



Ostriches on a South African Farm.

Plate III.

Breeding Pair with Chicks in Breeding Compound.

Plate IV.

Ostriches Grazing on a Lucerne Field.

Ostriches.

	£	s.	d.
1 breeding pair, at £25	50	0	0
	£50	0	0
Feathers from 2 birds, at £6 per annum each ...	12	0	0
15 chicks' feathers at six months, at £1 per chick ...	15	0	0
15 chicks, at £10 per chick	150	0	0
	£227	0	0

The area of land required for the sheep would be at least 150 acres, while 2 acres under lucerne would be all that is necessary to run the brids. Does ostrich farming pay? is the question of most people visiting an ostrich farm. Readers may be left to decide for themselves as to the profitableness of the industry after digesting the foregoing figures.

Times of Sunrise and Sunset at Brisbane, 1910.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·56	6·46	5·21	6·42	5·41	6·20	5·57	5·47
2	4·57	6·46	5·21	6·42	5·41	6·19	5·58	5·46
3	4·58	6·46	5·22	6·41	5·42	6·18	5·58	5·45
4	4·59	6·46	5·23	6·41	5·42	6·17	5·59	5·43
5	4·59	6·46	5·24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·24	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·39	5·44	6·14	6·0	5·40
8	5·1	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5·3	6·47	5·28	6·37	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·36
12	5·4	6·47	5·29	6·35	5·47	6·9	6·3	5·35
13	5·5	6·47	5·30	6·35	5·47	6·8	6·4	5·34
14	5·6	6·47	5·31	6·34	5·48	6·7	6·4	5·33
15	5·7	6·47	5·31	6·33	5·49	6·6	6·5	5·31
16	5·8	6·47	5·32	6·32	5·49	6·4	6·5	5·30
17	5·9	6·47	5·33	6·31	5·50	6 3	6·6	5·29
18	5·9	6·47	5·33	6·30	5·50	6·2	6·6	5·29
19	5·10	6·47	5·34	6·30	5·51	6·1	6·7	5·28
20	5·11	6·47	5·35	6·29	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·13	6·46	5·36	6·27	5·52	5·58	6·8	5·25
23	5·13	6·46	5·37	6·26	5·53	5·57	6·9	5·24
24	5·14	6·45	5·37	6·25	5·53	5·56	6·9	5·23
25	5·15	6·45	5·38	6·24	5·54	5·54	6·10	5·22
26	5·16	6·45	5·39	6·23	5·54	5·53	6·10	5·21
27	5·16	6·44	5·39	6 22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6 21	5·55	5·51	6·11	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6·43	...	..	5·56	5·49	6·12	5·18
31	5·20	6·43	...	...	5·57	5·48	...	...

Phases of the Moon.

			H.	M.	
3 Jan.	☽	Last Quarter	11	27	p.m.
11 „	●	New Moon	9	51	„
18 „	☾	First Quarter	8	21	„
25 „	○	Full Moon	9	51	„
2 Feb.	☽	Last Quarter	9	27	p.m.
10 „	●	New Moon	11	13	a.m.
17 „	☾	First Quarter	4	33	„
24 „	○	Full Moon	1	36	p.m.
4 Mar.	☽	Last Quarter	5	52	p.m.
11 „	●	New Moon	10	12	„
18 „	☾	First Quarter	1	37	„
26 „	○	Full Moon	6	21	a.m.
3 April	☽	Last Quarter	10	48	a.m.
10 „	●	New Moon	7	25	„
17 „	☾	First Quarter	0	4	„
24 „	○	Full Moon	11	23	p.m.

The Orchard.

PICKLING GREEN AND RIPE OLIVES.

By W. CATTON GRASBY.

The olive sold in the grocers' shops in England and Australia is almost, if not invariably, the pickled green olive, and usually goes by the name of "Spanish olive." The traveller in Southern Europe, however, almost as invariably (except in English hotels and houses) finds that the people use the ripe olive, and after tasting the two he finds that the ripe pickled olive, well prepared, is greatly superior in flavour to the green fruit. In California the custom is to pickle the olive after it has turned purple or black, but before it gets soft. Personally, after a varied experience of ripe and green olives, I much prefer the ripe. I have pickled both in various ways, and find the one as easy to do as the other, and this month have used a jar of brined, fully-ripe olives which were put in just five years ago. They came out perfectly firm and of excellent flavour. Usually I use lye for removing the bitterness from the olives before brining them, but that year I simply kept them in fresh water, changed daily, until the bitterness was removed.

There are many ways of treating olives to remove the bitterness and afterwards of preserving them, and much might be written on the subject; but probably those who desire to do the work will be less confused if the combined results of successful operators be condensed into a series of concise statements. In doing this, however, it is necessary to say that no claim is made for the processes recommended being absolutely better than others. All I wish to say is that the recipes, if properly carried out, will give satisfactory results.

The directions for green olives are taken with a few slight modifications from an excellent bulletin prepared by Frederick T. Bioletti, and published as Bulletin No. 137 by the College of Agriculture, University of California, in 1901. They are the result of a considerable series of experiments conducted at the Agricultural Experiment Station to determine the best method of preserving the green colour of the fruit, and at the same time give a good-quality pickled green olive.

TO PICKLE GREEN OLIVES.

Choice of Fruit.—Only large-fruited varieties should be used, as the small green pickles bring in a very inferior price. The olives should be gathered as soon as they have reached full size and before they have coloured notably. A slight pink colour on one side does little harm, as it disappears during the process, but olives which have reached the stage of ripeness indicated by this first change of colour will probably have less of the bright green than if gathered earlier. No two varieties should be pickled together, and the olives should be graded into three or four sizes. The reason for this is that different varieties and different sizes are almost sure to require different strengths of lye solution, and it is therefore impossible to attain the best results unless this selection is made. The proper strength of lye solution to use in each case is best determined by a preliminary trial, as follows:—

Preliminary Trial.—Take a series—say four—of pint preserving-jars, and fill them with the olives to be tested. Pour into them respectively a 1 per cent., 1½ per cent., 2 per ent., and 2½ per cent. lye-solution, sufficient to cover the fruit. At the end of forty-eight hours examine them. (It has been

found that a sufficiently strong lye-solution will extract the acid and bitter principles of even very bitter olives in forty-eight hours.) At the end of this time some of the weaker lye-solutions will be found to have neutralised, that is to say, all the lye will have been used up in acting upon the acids of the fruit. This will be made evident by the lack of the slimy feeling which the fingers have when dipped into a lye-solution and rubbed together. Suppose that the 1 per cent. and 1½ per cent. solutions are neutralised, and that the 2 per cent. still has a slight slimy feeling. This will show that a 2 per cent. solution is a little stronger than is necessary to neutralise all the bitter or acrid matters in the sample tested. If, now, we use a 2 per cent. solution in curing the bulk of the olives from which the sample was taken, we are able to preserve the green colour perfectly. If we use a somewhat stronger solution, say a 2½ per cent., the colour will bleach out a little; while if we use a much weaker solution, say a 1 per cent., the green will change to that disagreeable grey or brown which we wish to avoid.

Process.—The appropriate strength of lye-solution having been determined, the olives are placed in convenient receptacles, where they can be treated with a minimum exposure to light and air. For this purpose 50-gallon barrels with very large bung-holes (4 or 5 in. in diameter) and spigots are useful. After filling the barrels with olives the lye of the strength determined in the preliminary trial is poured in. Each barrel should be quite full of olives, and sufficient lye-solution should be put in to come flush with the bung-hole. At the end of forty-eight hours the lye should be drawn off, the olives quickly washed with two changes of fresh water, and the barrels filled immediately with a 2 per cent. salt solution. This brine should be replaced successively with a 4 per cent. and 8 per cent., and finally a 12 per cent. solution, in the last of which the pickles remain permanently. The successive brines should be allowed to act for from forty-eight to seventy-two hours each, according to the size of the olives, the larger sizes requiring more time for the brine to penetrate and to displace the excess of lye which remains. The whole process will thus take from ten to fourteen days.

Absence of Air.—The essential part of the process is to avoid exposing the olives to the air during the pickling, until all the bitterness and acid are completely neutralised by the lye. After this the green colour seems to be fixed, and exposure to the air does not change it much, though it is well, all through the process, to avoid leaving the olives uncovered by liquid any longer than necessary.

As different varieties of olives, and even the same variety in different seasons and from different localities, differ very much in bitterness, the importance of treating each variety separately is evident, as each will require lye-solutions of different strength to neutralise them. Very bitter olives, such as Mission, Sevillano, Manzanillo, and True Picholine, require solutions containing from 1½ per cent. to 2½ per cent. of pure potash lye, while olives containing little bitterness, such as Ascalano and Columbella, require only from ½ per cent. to 1 per cent. solutions.

To facilitate the preparation of lye solutions it is convenient to remember that an English standard gallon of water weighs approximately 10 lb., so that to make a 1 per cent. solution of Greenbank's concentrated lye use—

1 lb. lye in 10 gallons water.
½ lb. lye in 5 gallons water.
Or ¼ lb. lye in 2½ gallons water.

To make a 2 per cent. solution use—

1 lb. lye in 5 gallons water.
½ lb. lye in 2½ gallons water.
¼ lb. lye in 5 quarts water.

Those who do not care to go to the trouble of the preliminary tests are advised to use a 2 per cent. solution of lye, and watch and taste the olives

to see when the bitterness is removed. They may or may not get the best colour, but they will be able to make a pickled olive of excellent quality.

TO PICKLE RIPE OLIVES.

The olives are best when fully ripe but firm, and they should be picked carefully and not bruised. Olives of any degree of ripeness may be used, but all treated in one operation should be of the same degree of ripeness, of the one variety, and of uniform size.

Put the olives in 2 per cent. lye and allow to stand twenty-four hours. Wash well for twenty-four hours, changing the water three or four times. If bitterness has not gone add 1 per cent. lye-solution and let stand for twenty-four hours, draw off the lye, and replace with a 2 per cent. salt brine and allow to stand twenty-four hours. Draw off the brine and replace with another of same strength. After forty-eight hours, again change for fresh brine and test for bitterness. If the bitterness has gone, use a 4 per cent. brine, and allow it to remain four days, and then change the brine for fresh of the same strength for seven days; then change for a 10 or 12 per cent. brine, and the olives will keep indefinitely, but may mould on top. To prevent this either cover the vessels with a layer of olive oil or, better still, pasteurise the vessels and the olives by heating them up to 180 degrees Fahr. for twenty minutes, sealing with pasteurised corks or stoppers.

ANOTHER METHOD.

Place ripe olives in jar or cask and cover with a $1\frac{1}{2}$ per cent. lye and 2 per cent. salt. Allow to stand forty-eight hours. Draw off lye and add 2 per cent. brine for forty-eight hours. Change the brine, still using 2 per cent. and allow to stand three or four days, and repeat the operation, allowing to stand four days. Draw off brine and cover with a 4 per cent. brine for a week; then change and use an 8 per cent. brine for another week. Then draw off brine once more and place the olives in jars or bottles with a 10 to 12 per cent. brine and pasteurise.

SOME PRACTICAL HINTS.

In preparing olives for pickling it may be of interest to describe the apparatus found to be handy for the purpose. When at Roseworthy College in 1894 to 1896, Mr. A. J. Perkins, S.A. Government Viticulturist, pickled a few green olives each year, and in 1895 had an apparatus made from a design he saw described, I think, in a French journal. Its construction will be readily understood from the accompanying diagram (Fig. 1). A represents a tinplate

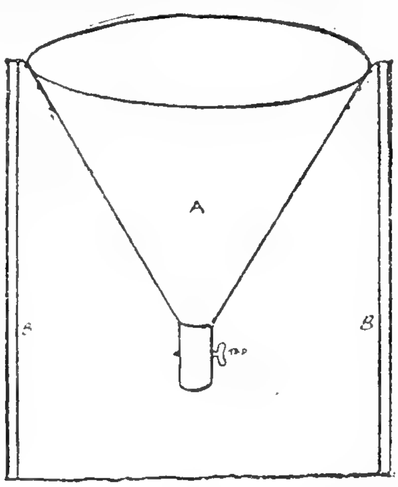


Fig. 1.

funnel-shaped vessel, about 18 in. in diameter at the top and terminating in a ½-in. waste pipe, protected by a grating and fitted with a tap. The top, or mouth, of the vessel was fitted with a movable tinplate cover to keep out the light and keep the olives submerged. The vessel was fixed in a simple tripod, made of ½-in. iron rod, of sufficient height to allow a bucket to be placed under the waste pipe. The stand is represented by BB, but is not fully drawn, as its form is not material.

The olives were picked carefully and placed in the funnel receptacle and covered with the lid, and then with water, which was changed daily until the bitterness of the olives was removed. I forget the time it took, but the process was tedious.

When I commenced to pickle olives in 1897 I procured a barrel-shaped glazed earthenware jar, holding five gallons. At the bottom was a hole for a wooden tap, and at the top a 3-in. circular hole. The vessel, I believe, was intended for brewing hopbeer, but seemed to me to be just suited for my purpose. The 3-in. hole was a handy size for putting in and taking out the olives, and the faucet hole for withdrawing the lye, water, or brine, and it has answered admirably. A small 3 or 5 gallon keg, with a tap and large hole in the top, as shown in Fig. 2, will answer the same purpose.

Fig. 2.

I pick the olives carefully and nearly fill the keg. Then pour in the lye and cover the hole with a small piece of board or slate to keep out the light. At the proper time I run out the lye and run in water to rinse the olives, and repeat the operation with lye or brine as required. By keeping the top carefully covered there need be no haste in finally bottling the olives, for they will keep for months in the keg. Brine should be boiled, and that added last should be added almost boiling hot, and should well cover the fruit, a film of oil being poured on top. A watch should be kept for mould, and should it appear it should be removed at once and the olives be treated with fresh hot brine in clean vessels and thoroughly pasteurised.

If the olives are too salt when opened a rinsing, or possibly a soaking in clean fresh water for a day or two, will remove the excess of salt without detriment to the olive.—" Garden and Field."

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND AND BRITISH NEW GUINEA.

BY F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order STERCULIACEÆ.

TRIBE BUETTNERIEÆ.

COMMERSONIA, Forst.

C. echinata, *Forst.* (" Dim " or Brown-Kurrajong), **var. Bancroftii.** This undoubtedly has the most beautiful variegated foliage that has been met with in the indigenous vegetation. The leaves, for the most part, are of a bright yellow, the other parts are patches of very light and dark green, the leaves do not differ from the normal form, either in form or size, thus the plant will form a most conspicuous one for ornamental plantations. It may be kept down to the size of a large shrub or allowed to form a small tree. Its propagation should not be difficult, from cuttings or layers.

Hab.: The plant was met with in a scrub near Brisbane by *Dr. Thos. L. Bancroft,* who is now trying to propagate it.

Order RUBIACEÆ.

RICHARDSONIA, Kunth.

R. stellaris, *Cham. and Schlecht.* A prostrate herbaceous perennial. Roots tortuous. Stems angular, tortuous, hairy, here and there rooting from the nodes. Leaves lanceolate, ovate-lanceolate or linear-lanceolate, attenuate-acuminate, sub-sessile, entire and more or less hairy; bristles of the stipules usually 5, longer than the sheath. Heads of flowers hemispherical-terminal. Calyx-segments 4, subcilate ciliate. Corolla glabrous, about equal in length to the calycine teeth, white. Cocci obovate glabrous, slightly keeled; seeds brownish, smooth, slightly hollowed on the inner face.

Hab.: Brazil. Of late years became naturalised within a few miles of Brisbane (Nudgee), but is scarcely likely to become as troublesome a weed as *R. scabra.* Field Naturalists' Excursion.

Order FUNGI.

STEREUM, Pers.

S. amænum, *Lev.* Cooke's Australian Fungi, p. 187. Gregarious; pileus coriaceous membranaceous, resupinate, oblong-ovate, zoned, hirsute, white; margin free, thin, hymenium even, flesh-colour, then purplish, substance floccose, of the same colour.

Hab.: Stannary Hills, *Dr. T. L. Bancroft.*

BRITISH NEW GUINEA.

Order FUNGI.

LENTINUS, *Fries.*

L. velutinns, *Fries.* Sacc. Syll. Fung. v. 589. Colour of plant, pale cinnamon. Pileus 2 to 3 in. broad, coriaceous, thin, infundibuliform, margin reflexed. Stem solid, 2 to 3 in. high, velvety when dry, slender and tough, gills obconic-decurrent, crowded, tender, narrow, slightly dimidiate.

Hab.: British New Guinea, *A. J. Boyd.* First met with in Brazil.

TRAMETES, *Fries.*

T. gibbosa, Pers., *Fries.* Sacc. Syll. Fung. vi. 337. Cooke Brit. Fung. i. 286. Whole plant white. Pileus sessile, dimidiate, obsoletely zoned, corky, convex and tuberculated, velvety, expanded behind, gibbous, villous, margin obtuse, 3 to 6 in. broad. Pores linear, mostly straight, except at the base, where they are roundish or irregular, very narrow, pale tan.

Hab.: British New Guinea, *A. J. Boyd.* An Asiatic and European species.

Horticulture.

NARCISSUS CULTIVATION.

The narcissus requires a certain amount of care, but still the flower is very easily grown in Queensland. The best soil is a nice moist sandy loam, but it is not at all particular as to soil, and the bulbs may be left in the ground for several years after planting. In preparing the ground, if the work has been done by the plough, the ground should be broken up by harrowing and rolling, but if dug by the spade it should be broken up as digging proceeds. This accomplished, and a good tilth obtained, the land is then ready for planting. The soil should be uniformly level, as hollows in which water stands injuriously affect the bulbs.

Manures.

Fresh farm-yard manure must never be used for narcissus cultivation; its ammoniacal constituents have an injurious effect upon the plants, and this is the chief reason for recommending that they should follow such a crop as potatoes, where the rankness of a heavy manuring has already expended itself. Sixty tons of farmyard manure per acre may appear to be an unnecessarily large amount, but, unless the ground is in good condition, it is not an excessive quantity. Good bulbs, like most other crops, cannot be grown on poor land. If it be necessary to plant on land which has not recently been well manured, bone-meal is probably the best artificial manure to use at the time of planting; it should be applied at the rate of 10 to 15 cwt. per acre, and can either be harrowed or raked in before planting commences, or worked in as planting proceeds.

Time of Planting.

As a general rule, the shorter the period the bulbs are out of the ground the better. In some cases, such as in the *Poeticus* section, new roots are formed simultaneously with the drying of the old, and a decided injury is done by keeping such varieties out of the ground for a lengthened period. The best results are obtained by planting in March, or perhaps in February.

Methods of Planting.

Planting should be done at a depth of 2 to 4 in.—the larger bulbs at the greater depth, and the smaller ones proportionately shallower. Various methods of planting are adopted, and the area to be planted will influence the method decided upon. Many large growers use a one-horse plough, to which is fixed a special share that works in the bottom of the furrow and makes the necessary impression for the reception of the bulbs; and on large establishments the work is expeditiously performed in this way. From twenty-four to thirty planters are necessary to keep the plough constantly at work, and an acre a day may be planted. The cost would be:—Man and horse, per day, 8s.; thirty planters, at 2s., £3; man in charge, 4s.; total, £3 12s. per acre.

This method is suitable where a single variety of bulb is being planted in large quantities. The work proceeds in the ordinary way of ploughing, one furrow covering the bulbs already planted in the furrow previously made. The furrows are about 9 or 10 in. wide, and every seventh furrow is left unplanted, and this forms a path, which is necessary for getting among the bulbs when bloom-gathering, cleaning, &c.

Where small areas are planted, a different method must be adopted. The following is a useful plan:—First divide the land into suitable divisions, say 50 ft. wide, with 18-in. parts between. Then stretch a line across the end of the first division, and with a spade throw out a shallow opening in which to plant the first row of bulbs. This done, shift the line the width of the rows, say 9 in.; then proceed to open the second furrow, covering the first and already planted row with the soil from the second. Proceed thus with succeeding rows, again leaving every seventh unplanted to form a path. By this method one man with a spade will keep two planters busy, and the cost will be about £6 per acre.

Another method for the small grower, after he has marked his land into 50-ft. divisions with 18-in. paths, is to mark each division across with beds 3 ft. 6 in. wide, and with paths 12 in. wide. The soil from the first bed is taken out to a depth of 3 in., and wheeled to the far end of the division; this first bed is then carefully raked, and marked across in rows 6 in. apart. The bulbs are then planted, and this bed is covered with soil taken from the second bed, and so the work proceeds to the end of the division. This method, although a little more expensive than the preceding, has advantages, especially where handling a considerable number of varieties in small quantities, as the danger of mixing sorts is less likely to arise.

The quantity of bulbs necessary to plant a given area will vary considerably, according to the size of bulb produced by the particular variety. From 5 to 6 tons may be taken as an average weight to plant an acre.

VARIETIES TO CULTIVATE.

The following varieties may be recommended for the production of outside bloom and for forcing under glass. The prices given afford some indication of the average value of the different kinds, but they will naturally vary according to season and other circumstances. The demand which has arisen in recent years for flowers for house decoration has created quite a large industry in bulb forcing, and as the demand for varieties suited for this purpose is greater than for the numerous varieties grown by the bulb specialist, these are more likely to prove remunerative to the small grower. When growing for bulb production, the bloom is also marketed in spring, so that profits both from bloom and bulbs are obtained.

1st. *Golden Spurs.*—A deep rich yellow trumpet. It is the first to bloom of those recommended in this leaflet, and is a variety extensively grown for forcing. Wholesale price for first-size bulbs varies from £1 10s. to £1 15s. per 1,000. All sizes as lifted from £25 to £30 per ton.

2nd. *Incomparabilis Sir Watkin.*—A large handsome flower with primrose perianth and yellow cup. A strong grower and a good forcer. Wholesale price for first-size bulbs from £1 5s. to £1 10s. per 1,000. All sizes as lifted from £20 to £25 per ton.

3rd. *Emperor.*—A large flower having a deep primrose perianth and yellow trumpet. It is a very strong grower. Wholesale price for first-size bulbs from £1 5s. to £1 10s. per 1,000. All sizes as lifted from £15 to £20 per ton.

4th. *Bicolor Horsefieldii.*—A free-flowering variety, with white perianth and yellow trumpet. Wholesale price for first-size bulbs from 15s. to £1 5s. per 1,000. All sizes as lifted from £10 to £15 per ton.

5th. *Bicolor Empress.*—This is a very similar variety to the preceding one, but flowers about a week later. Wholesale price for first-size bulbs, £1 10s. to £1 15s. per 1,000. All sizes as lifted, £15 to £20 per ton.

6th. *Barri Conspicuus.*—A flower with a broad yellow perianth and yellow cup edged with orange-scarlet. This variety is much admired, but, unfortunately, it is apt to lose its colour in bright sunshine. To obviate this it is well to

plant it in partial shade. Wholesale price for first-size bulbs, 12s. to 16s. per 1,000. All sizes as lifted, £6 to £8 per ton.

7th. *Poeticus Ornatus.*—This white narcissus is probably the most profitable variety that anyone can handle, and it is grown in large quantities for cut flowers both in the open and under glass. It blooms very freely, and, being a small bulb, can be planted closely, thus giving a much larger yield per acre than any other variety. Wholesale price for first-size bulbs, 10s. to 15s. per 1,000. All sizes as lifted, £20 to £25 per ton.

8th. *Bicolor Grandee.*—This is a late trumpet narcissus which flowers after the majority of the others, and usually sells well as a cut flower. Wholesale price for first-size bulbs, 12s. to 15s. per 1,000. All sizes as lifted, £6 to £8 per ton.

9th. *Pheasant Eye.*—This is grown chiefly for cut-flower purposes; like the preceding, it flowers when the majority of narcissi are past, and in some years yields the grower a good profit. In other seasons, however, prices may be lower, and as the bulb is cheap it is not advisable to plant it very extensively. Wholesale price for first-size bulbs, 5s. to 7s. 6d. per 1,000. All sizes as lifted, £3 to £5 per ton.

10th. *Poeticus plenus or Double White.*—This is the last of all the narcissi to flower. It blooms towards the end of May, and usually realises good prices. Like the preceding, this is recommended for the value of the bloom rather than for the bulb crop, and may remain three to four years without transplanting. It also likes a rather heavier soil than the majority of narcissi, and does best when deeply planted, say from 6 in. to 8 in. Wholesale price for first-size bulbs, 10s. to 12s. 6d. per 1,000. All sizes as lifted, £10 to £12 per ton.

MARKETING THE BLOOM.

Gathering and Bunching.—As the blooms expand they must be gathered and marketed whilst fresh. An effort should be made to have the bloom fit for market earlier than would be the case if left to take its natural course. This can be accomplished by pulling the flowers when in the bud state and opening them in water under glass, or by erecting a temporary covering of glass over the growing plants. The grower without glass is at a great disadvantage, and glass is absolutely necessary to obtain the best results, as without a greenhouse the grower is at the mercy of the elements at a time when much rough and stormy weather is frequently experienced. The cultivator with glass at his disposal can gather the flowers in the bud state, open them in water, and thus ensure all his bloom reaching the market clean and in good condition.

To avoid glutted markets, it is sometimes desirable to prolong the bloom for a few days; this is done by placing the buds in water in a cool, shaded shed. The best receptacles in which to place the blooms are narrow troughs or boxes divided into several sections, each about 4 in. wide.

Sericulture.

SILKWORM CULTURE—*continued.*

LIFE-HISTORY OF THE SILKWORM.

The mulberry-feeding moth (*Bombyx mori*), which is one of the principal moths used for the production of silk, belongs to the Bombycidæ, a family of Lepidoptera, in which are embraced several of the largest and most handsome moths. The *Bombyx mori* is a conspicuous ashy-white moth, and, through the result of hundreds of years of domestication, is incapable of flight. The male is about ½ in. in length, and the female is a little longer and stouter, its wings being short and weak. After copulation, which occupies about six hours, the male soon dies. The female almost immediately afterwards commences to deposit her eggs, and continues doing so until she has laid about 400. After oviposition has taken place the female dies.

As is common with all insects of its class before reaching the winged stage, *Bombyx mori* exists (1) as an egg, (2) as a caterpillar or larva, and (3) as a chrysalis.

The Egg.—The egg of the common silkworm is about the size of a mustard seed, being yellowish at first, but in a few days it assumes a darker colour. As the *Bombyx mori* is single brooded, *i.e.*, produces one generation in a year, its eggs must be hibernated in a cool chamber, preferably in a cold-storage room, for about six months at a temperature of from 25 deg. to 40 deg. Fahr. in order to ensure a uniform hatching.

The First Age.—After the eggs have hatched, which usually occurs in the morning, they should be placed on the mosquito netting on the shelves which have been previously prepared to receive them. It is most essential that each tray should be marked with the date of the birth of the worms, and each day's hatchings should be kept entirely separate.

If it should happen that a hatching occurred at a temperature of from 68 deg. to 70 deg. Fahr., this temperature should be maintained during the first age, and the worms should be fed at least eight times during the twenty-four hours. If, however, the temperature at the birth of the worms happened to be from 75 deg. to 77 deg. Fahr., it should be slightly diminished one or two degrees, and the worms should be fed ten times during the twenty-four hours. It must be distinctly understood that the appetite of the worms increases or diminishes with the temperature of the rearing room. When feeding during the first age, only young and tender leaves without stems should be used, and these should be cut up very fine and sprinkled over the worms. The leaves should also be distributed uniformly over the trays so as to prevent the worms from crowding together and in order to enable them to make their changes simultaneously. A greater quantity of leaves than is required at one feeding should not be cut, as they become withered very quickly and consequently lose their nutriment. The leaves should not be kept in water, but preferably in a basket, over which a damp cloth should be placed to enable them to retain their moisture.

During the feeding of the worms the doors and windows should be left open for the purpose of enabling them to be supplied with a good supply of fresh air. After feeding, however, these should be closed, unless the day is warm, when they might be permanently left open, or might be protected by curtains through which a current of air passes freely.

Another important factor to be remembered in connection with silk-worm culture is the daily cleansing of the trays and shelves, because the bed upon which leaves and excrement are allowed to accumulate constitutes a very great source of danger to the healthy condition of the worms. The most convenient method of procedure to adopt is the following:—The last meal at night should be placed on the mosquito netting and extended over the worms. By the morning the worms will have mounted to this tray in search of fresh food. Then these trays should be lifted up, beginning at the top shelf, and placed on clean shelves. The worms which may have commenced moulting in the under trays should be handled with great care, which can be safely accomplished by means of a soft brush or feather. This cleaning should preferably be done in a separate room or under a well-protected veranda, and when finished the litter should be removed some distance from the rearing room, because if allowed to become dry the dust which arose from it might be carried in the air to the rearing room and cause disease to the worms. It will be found that this litter makes an excellent manure.

Towards the sixth day it will be observed that the worms begin to eat less, which is a sure sign that they are preparing to undergo their first moult. The moulting of the worm can be easily distinguished on account of the fact that the head swells, the skin becomes white, and the body transparent, and it remains practically motionless for a short time. It then becomes necessary to double the space required for the worms.

The worms which have not moulted will have crawled up to the fresh leaves, whilst those which have remained below will have already begun to moult. The backward ones should therefore be kept entirely separate and put in a warmer place, preferably on a higher shelf, and given several extra feeds. The feeding of the worms should be gradually diminished, and whenever the backward ones begin to moult should be ceased entirely as soon as a single worm comes out of the moult. A fast of twenty-four hours will not hurt the advanced worms, while the extra feeding given to the backward ones will practically enable them to become equal to those which have already moulted.

The Second Age.—The coming out of the sleep can be easily recognised by the worms moving their heads, which are now whitish, whilst the rest of their body is greyish in colour. As worms take several hours to regain their strength, no food should be given to them until all have moulted. Four days after coming out of the first moult the worms begin to moult again. Then the same method of procedure should be undertaken as before described, that is, place the backward worms on separate trays and give them extra feeding until they have become equal with those which have already moulted. After each moult the space allotted to the worms should be doubled, as crowded worms become sickly and diseased.

The Third Age.—After the worms have moulted a second time they cease to be grey and assume a whitish colour. The third age is undoubtedly the most critical period of their existence, and one in which they seem to suffer the most; consequently precautionary measures should be adopted to prevent the temperature from falling below 68 deg. Fahr. As in the two former ages, the worms should be lightly fed after coming out of this moult until they have regained their strength, and as they have doubled in size during this age the space alloted to them should be accordingly increased; they can also be fed upon whole leaves.

Towards the sixth or seventh day of this age the worms begin to be languid and lose their appetite, and are consequently ready to commence another change.

The Fourth Age.—During this age small branches of leaf may be given to the worms instead of whole leaves as in the former age, and the number of meals may be reduced to four per day. If the temperature is kept at from 68 deg. to 70 deg. Fahr. the period of this age will last about nine days. If, however, it is desired to reduce this age to seven days the temperature should be raised to 72 deg. Fahr.

The Fifth Age.—During the fifth and last age the worms have a voracious appetite which is difficult to satisfy. At the end of about five days the body of the worm suddenly diminishes in circumference, and its excrement, which was formerly dry and firm, now becomes soft and moist, and its appetite capricious. The worm generally remains in this state for about three or four days, when it suddenly ceases to feed and endeavours to get away from its food.

It should be noted that at the end of the fourth moult bundles of dried bush, which is entirely free from gum, should be placed beween the shelves in rows fully 15 in. apart, the branches being of sufficient length to form an arch in which the worms will crawl up to spin their cocoons. Straw may also be conveniently used for this purpose. As soon as they have found a suitable place they evacuate their digestive canal and begin to throw around them an irregular net in which the cocoon which will be spun later will be suspended. Sufficient space should be given them to prevent them from being too crowded, for if two worms spin together they form a double cocoon, which reduces its value, as the silk cannot be unwound.

The caterpillar then becomes transformed to the chrysalis, which transformation takes from seven to ten days from the time at which the first worm began to spin. The cocoons then become mature, and this is the best time to gather them. The thread of a cocoon is continuous with that of the web and varies in length from 1,200 yards to 1,600 yards.

PREPARATION OF COCOONS FOR THE MARKET.

After the cocoons have been gathered the chrysalids should be killed by means of heat or suffocation. The methods most popularly employed are (1) the heat of the sun, (2) hot dry air in a stove, (3) hot humid air in a stove, (4) steam, (5) carbon bisulphide or some other gas.

From the results of experiments which have been conducted in the Transvaal we find that the cleanest, cheapest, and most effective method of destroying the chrysalids is to put the cocoons on large iron trays in thin layers and then place them in the sun for several days. The trays containing the cocoons should, of course, be brought inside the rearing room during night and protected from rats and mice.

We cannot recommend the use of carbon bisulphide, as this method is not only expensive, but far too dangerous for the ordinary sericulturist to undertake. Carbon bisulphide is a liquid which volatilises readily at ordinary temperatures, the gas is poisonous, is in confinement inflammable and explosive, and it is therefore necessary that the greatest precautions should be adopted that no light, such as a lighted cigar, pipe, or match, comes in contact with it.

The cocoons should afterwards be carefully sorted into three classes: (1) The perfect cocoon, (2) the double cocoon, and (3) the defective or spoiled cocoon.

If the cocoons are not intended to be marketed immediately after the chrysalids have been killed and thoroughly dried, they should be packed in boxes, care being taken that they are not crushed during this operation.

RULES TO BE OBSERVED IN THE REARING OF SILKWORMS.

For sericulturists who intend rearing an ounce of silkworms, it may be stated that an ounce contains approximately 40,000 eggs, and if ordinary precautions are adopted in the rearing it may be assumed that 30,000 eggs will hatch.

Ages of Worms.	Approximate Quantity of Mulberry Leaves Required for Feeding Worms which Hatch from 1 oz. of Eggs.	Space Required in Trays.	Temperature to be maintained in the Rearing Room.
First age	About 10 lb. ...	10 square feet	68 degrees to 70 degrees Fahr.
Second "	" 30 " ...	30 " "	70 " Fahr.
Third "	" 110 " ..	90 " "	70 " "
Fourth "	" 340 " ...	270 " "	72 " "
Fifth "	" 1,900 " ...	810 " "	76 " "
TOTALS	About 2,490 lb. ...	1,210 square feet	

DISEASES OF SILKWORMS.

The principal diseases against which the sericulturist has to guard are:—

1. *Pebrine.*—This disease is caused by a transparent egg-shaped microbe about the three-thousandths of a millimetre in size, which is found in the egg of the silkworm and is present in the body of the worm on hatching. It attacks the worm, chrysalis, and moth at all stages; as a rule, the worm does not die, but produces a bad cocoon. This disease was first observed in France in 1845. It has afterwards been observed in Italy, Spain, Portugal, Turkey, China, and Japan. It may be stated that between the years 1833 and 1865 the annual crop of cocoons in France was reduced by this disease from 57,200,000 lb. to 8,800,000 lb.

The remedy for preventing the dissemination of this disease is to have all moths which are used for breeding purposes microscopically examined, and only eggs laid by healthy moths retained for rearing worms. Black spots are the outward characteristics of this disease.

2. *Flacherie,* or indigestion, generally attacks worms after their fourth moult, and without any apparent cause they begin to languish and shortly afterwards die. The principal causes which contribute to the dissemination of this disease are (1) eggs being spoiled through careless preservation; (2) careless feeding; (3) wet, sweating, and fermented leaves being fed to the worms; (4) lack of a proper system of ventilation; (5) excessive heat; (6) dust; and (7) keeping the worms too crowded on the trays. In general the greatest care and cleanliness should be observed in order to prevent the worms from contracting this disease.

3. *Gattine.*—This disease generally attacks the worms in the first ages, more especially after moulting. The disease generally manifests itself in indifference to food, torpor, dysentery, and emaciation. Worms which contract this disease do not generally die before mounting to the bush for the purpose of spinning their cocoons. Immediately this disease is observed the following precautions should be adopted: (1) The beds should be changed, and the worms placed on disinfected shelves; (2) the suspected diseased worms should be burned.

4. *Muscardine.*—In this disease the worm becomes whitish and hard, shows a disinclination to eat, and then dies. It is due to a micro-organism which is thought to enter the body by way of the leaves. Great care must be taken in destroying worms affected by it, as the disease is most infectious.

The chief cause of this disease is neglecting to change the beds and keeping litter in and around the room. Should the worms contract this disease the floor of the rearing room should be washed with a solution of copper sulphate and the room afterwards fumigated with sulphur in the manner previously described.

5. *Grasserie.*—In this disease the body swells visibly, and the segments protrude. The worm becomes whitish in colour and lustrous; it cannot sleep, but wanders restlessly about. This soon wearies it, its body swells and eventually bursts, emitting a white pus. On account of its infectious tendencies, worms affected by it should at once be destroyed.

REVIEW OF WORK DONE IN TRANSVAAL.

Sericulture was commenced in the Transvaal by the late Mr. C. B. Simpson during the summer of 1906. He imported an ounce of the European variety of silkworm eggs (*Bombyx mori*) for the purpose of conducting experiments as to whether this industry could be established with success. After his death these experiments were carried on each year.

During the past summer (1908-9) we carried on the largest and most important experiment hitherto conducted, and it is gratifying to have to state that it was very successful. Hundreds of people have visited our laboratory, and have received information regarding sericulture, and have been shown the methods to be adopted in the unwinding of the silk from the cocoons, although the machine which we used was of a very primitive nature. The interest in this industry has increased to such an extent that we have received numerous inquiries during the past few months as to whether the Department intends to supply silkworm eggs free of charge, and also what arrangements are to be made regarding the purchase of cocoons raised in the Transvaal.

We have already proven by experiments that the European variety of silkworm can be successfully reared on the high veld of the Transvaal from October to the end of March, but in the low veld we have found that the temperature during the summer months is too high for rearing silkworms; however, such rearing can be successfully done from April to the end of September. Several municipalities have promised to plant mulberry trees in the vacant plots in their towns in order to enable the poorer people to commence this industry in a small way. Arrangements are also being made to obtain a variety of mulberry and castor-oil eating silkworms from Ceylon for the purpose of discovering which is the most suitable variety for the low veld of the Transvaal. In a year or two, when there is a sufficient supply of mulberry trees growing, this industry could be prosecuted more vigorously than at present.

An experiment was also conducted at the Swiss Mission Station, at Shiluvane, Zoutpansberg District, during the months of August and September last year, for the purpose of demonstrating to the farmers in that neighbourhood the feasibility of establishing sericulture as an industry in Zoutpansberg. Although the experiment was a great success, the number of farmers who visited Shiluvane was very disappointing.

In order to encourage the industry we informed intending sericulturists before the commencement of last summer that we would be prepared to purchase the cocoons raised by them at 3s. 6d. per lb., and up to the present date about 40 lb. have been purchased.

One great drawback at present is the fact that if the cocoons are sent to Europe their bulk is so great, and they would take up so much space, that the cost of transportation would be excessive. The most economical and

practical method to adopt would be to have the silk unwound in the Transvaal at some central place, preferably Pretoria, and then forwarded to the factories in Europe as raw silk, as is done in India and China. This work can only be economically done by proper machinery. In France one girl can attend to several of these machines, whereas our experience has been that if the unwinding is done by hand a person can only unwind about 22 grammes of silk in five hours. Such silk can be sold at the rate of about 15s. per lb. When we take into consideration the cost of the rearing of the worms, it will be readily understood that this method of unwinding is not one which can be recommended. It has been estimated that a woman or girl on a farm where there are plenty of mulberry trees can rear as many as four lots of worms during the summer and thereby make a handsome profit during the season.

The following prices have been offered in France for Transvaal cocoons:—

Cocoons of best quality	..	14.5 francs per kilo (2.20 lb.).
Double cocoons ..	..	5.0 " "
Pierced cocoons ..	..	8.55 " "

(1 franc equals 10d.)

We have found considerable difficulty in the importation of eggs from Europe. If we obtained eggs of the season in which our order was sent in, the eggs would arrive at Pretoria too young, and, consequently, when we endeavoured to hatch them out they hatched very unevenly and continuously for the space of a month or more. The eggs should be at least ten months old, in which case all the worms will emerge in the space of four or five days, thus shortening the time necessary to feed them. The rearing of our own eggs cannot be recommended unless we have a trained bacteriologist to supervise the work.

It should be distinctly understood that sericulture in the Transvaal is at present only in the experimental stage, and whilst we are endeavouring to foster it in every possible manner, several years may elapse before it is placed on a sound commercial basis. In other countries it has been found that artifical stimulation has never resulted in success, more especially where an abundant supply of cheap labour was not available.

Any further information which may be required by people who intend to commence silkworm culture will be gladly supplied upon application to the Government Entomologist, Pretoria.

COTTON-PICKING MACHINE.

A new cotton-picking machine is reported to have been successfully operated under difficult conditions (says the "Queenslander"). It consists essentially of a large drum containing a fan operated by a $2\frac{1}{2}$ h.p. gasoline engine. On the outside of the drum are connected four pieces of spiral rubber suction hose, tapering from $2\frac{3}{4}$-in. at the drum end to $1\frac{3}{4}$-in. at the nozzle. The cotton is drawn into the machine through these tubes and passes into a square exhaust pipe over the top of the machine and down to about 4 ft. from the base of the wagon carrying the machinery. This is the type of mechanical cotton-picker which (says an American exchange) we believe will eventually be made to work successfully. The draught power and operating power should, as in this case, be independent of one another.

[We seem to have heard some time ago of this suction machine, but like all other mechanical contrivances for cotton-picking, it went into oblivion. Let us hope that this is not the old idea revived, but something new and workable.—Ed. "Q.A.J."]

Tropical Industries.

THE CULTIVATION OF CACAO (*Theobroma cacao*).

With the opening up of new areas of land in the tropical regions of Queensland, with a view to the cultivation of rubber, cocoanuts, bananas, sisal hemp, other tropical products will also probably engage the attention of intending planters, and amongst the former "cacao," familiarly known as cocoa, will be sure to figure.

The cacao-tree is a native of Mexico, Guatemala, Venezuela, Columbia, and in Demarara (British Guiana) it is found growing wild in vast quantities. The generic name, "Theobroma," has a singular meaning. It is composed of two Greek words meaning "food for the gods," and was given by the great botanist Linnæus in token of his appreciation of the beverage prepared from the nuts or beans contained in the pod.

The cacao is a handsomely-formed evergreen tree of from 12 to 16 ft. in height, with an upright stem of some 6 ft. before the branches begin to spread, having a diameter of about 12 in. at the base.

The bark is smooth and of a cinnamon-brown colour, deepening with age. The bright green flowery leaves are oblong, lance-shaped, from 9 to 16 in. long, and 3 to 4 in. wide. The flowers are plentiful, small, of reddish colour, without perfume, springing directly from the lower sides of the larger branches, and from the trunk itself, and have been known to emerge even from the root when left uncovered. Most of the flowers fall without fructifying, and there is seldom more than one fruit from each cluster of flowers. The wood is white, porous, and light. The fruit varies a good deal in size and colour, according to variety. It is an oblong, ovate capsule, pointed at one end, deeply furrowed longitudinally, from 6 to 10 in. long and from 3 to 5 in. wide at the broadest part. Specimens of the fruit may be seen at the Queensland Museum. In colour, the ripe fruits vary from a delicate yellow to a purple. The rind is about ½-in. thick, somewhat tough and flesh-coloured within. Inside, the fruit is divided into five compartments, each containing from 5 to 10 flesh-coloured nuts embedded in a gelatinous white pulp, of the consistence of butter, sweet, with a slightly acid flavour. These nuts, which have much the appearance of thick almonds, lose their vitality soon after being removed from the capsule, but if left in, preserve it for a considerable time.

It is from them that the cacao of commerce is manufactured. In Samoa, where the Criollo and Forastero varieties are usually planted, the average production of a four-year-old tree is 1 lb. of commercial cacao from 16 to 18 fruits.

The *Theobroma cacao* is a deep-rooting tree, requiring a rich soil which is loose to a considerable depth. It thrives better and arrives at maturity earlier on low, moist, alluvial plains, but by no means objects to higher ground, provided the soil is rich and the trees are protected from high winds, the most dangerous enemy of the cacao-tree. This shelter can be provided by planting shade trees such as the coral-tree (*Erythrina umbrosa* or *E. velutina*) between every two rows of cacao. I saw such shade trees planted on a plantation in New Guinea, but they were planted within a few feet of *every cacao-tree*. These shade trees grow very rapidly, and have an abundance of thick foliage.

The methods of forming plantations differ in unimportant particulars in different countries. Sometimes the plants are raised in a nursery and transplanted in about three months' time, when they are 15 to 18 in. high, in

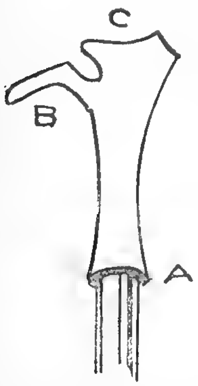
straight rows, 15 to 20 ft. apart. This will give about 190 trees per acre. The holes into which the young trees are transplanted should be 12 in. in diameter and 2 ft. deep, but the subsoil must be free from stones to a depth of about 4 ft., as these hinder the tap-root from going down perpendicularly.

Where the plantation—as is more frequently the case—is made without the preliminary nursery work, the following method, with more or less variation in detail, is followed:—Only the finest fruits are selected from such trees as promise from their thriving, healthy appearance to produce only sound seed. Only the best-shaped nuts are used. These are taken out and thrown into water. Those that swim are rejected, and the others are cleaned of their pulp and kept moist till they show signs of sprouting. In some countries a banana leaf is placed upright on one side of the hole, which is then filled in. The seeds are then set in perpendicular position, the thick end down, three in a hole, triangularly, 2 in. below the surface of the soil. Then the banana leaf is bent down over them and kept in position by a stone, as a shade from the sun. In about ten days the young plants appear, when the leaf is removed and any temporary rustic shade is substituted. When the plants have become larger the strongest is allowed to remain, the two others being removed. These serve afterwards to supply "misses."

The sowing is done in the rainy season, and, after the plants appear, should the weather be at all dry, they must be mulched and watered. In two years the plants will be about 6 ft. high, and in about two and a-half years will begin to flower, but these flowers must be pulled off, as too early bearing has an injurious effect on the tree. In the fourth year a moderate crop is allowed to mature, after which the trees bear as they will. The bearing powers of the tree are greatest from the tenth to the twenty-fifth year, and it generally dies, unless well cared for, in the thirtieth year. But in well-managed plantations the tree will continue to bear for forty years or longer.

Although the fruit ripens more or less all the year round, there are two principal harvests. The first in April, the second in October. I obtained ripe fruits in the Sogeri district in Papua in November, 1909. Of course, the weather has a great deal to do with the ripening of the fruit. The fruits are gathered as they ripen. The gathering must be most carefully done to avoid any damage to the tree.

In course of time, the height to which the tree attains renders it impossible to detach the fruit from the ground. The labourer must on no account climb the tree, consequently, an implement called the cacao knife must be used. This is shaped as shown in the diagram. The edges *b* and *c* must be as sharp as a razor. Some practice is needed to work with such a knife without injuring the tree, for, of course, the tearing off of branches must be avoided. Planters usually train some of their boys especially for this work, and these are further instructed in the methods of dealing with any pests or diseases they may observe in the trees. When the lower fruits are cut off the abovementioned knife must be used, and in such a manner that the stem is cut close up to the fruit without injuring the bark of the tree. The ripe fruits only are taken and placed in heaps, and the contents of any fallen fruits which have burst open are gathered up and placed in baskets. When a large quantity of the pods has been collected, they are at once opened, as they do not improve by lying over a couple of days, for if the cacao has exceeded a certain state of ripeness it will ferment even while still on the tree, owing to the fermentation of the internal surrounding tissue. When the fermentation of the fruit left on the tree is complete, the moisture of the fruit, called in Trinidad "vinegar," is used up. Then the cacao bean dries up, and it becomes less in value and unpleasant to the taste. This fermentation naturally proceeds quicker in the heaped-up fruits. If they are allowed



to remain too long in the heaps, the "vinegar" which cannot escape affects injuriously the aroma, besides which the proper fermentation will have got out of hand. Therefore, only so many fruits should be gathered as can be broken up daily. The nuts or beans should be graded in two sizes, to be fermented separately. The proper fermentation and drying of the beans has a great influence on their quality, which goes without saying. When the hitherto hard beans show a certain elasticity when pressed between the fingers, the fermentation may be considered complete. The process of fermentation I will describe further on.

In some countries the cacao beans are washed after fermentation. In Surinam it is considered that washing destroys to some extent the aroma. But washed beans have a better appearance than unwashed, and bring a higher price in German markets. Still, washing is not to be recommended.

The next process is to dry the beans, washed or unwashed. This may be done in the sun or in drying-houses. Sun-drying is always resorted to, except in countries where there is constant rain. The beans are exposed on wooden platforms, to a depth of about 3 in. They are covered as soon as evening sets in and dew begins to fall by a rolling zinc roof. During the drying they must be constantly shovelled about with wooden shovels.

When the cacao is properly dried it may be cracked between the teeeth, and is ready for export.

Pruning the Tree.

Like all other fruit trees, the cacao-tree requires to be systematically pruned. At a height of from 4 to 6 ft. a young tree forms a crown with from four to five branchlets. Now is the time to give it the proper shape. If the pruning is delayed, the tree will suffer, as the branches will have become too strong and woody. According to the vigour of the young tree, either three or four branches may be left. Lateral branches will be produced on only one part of the tree, and no others will form. These branches run up, and their development must not be hindered by pruning or shortening; a few laterals will appear close together on the main branches. These must be removed as soon as they grow inwards towards the trunk. The object is to give the tree an umbrella shape, consequently all branches which interfere with this must be taken off, and no delay must take place. They must be removed before they become woody. Pruning must also be attended to immediately after harvesting each main crop, but shoots from below must be destroyed whenever they appear. The cacao knife before mentioned must be used as a pruning knife.

The shade tree must also be pruned, and the heavy crown must be thinned out. This must be done before the beginning of the rainy season.

Enemies of the Cacao.

The principal enemies of the tree and fruit have to be combated by the cacao planter. These are: Unsuitable weather conditions, such as heavy winds and hurricanes, too little or too heavy rainfall, and injurious animals, insects, and fungoid pests. With respect to wind, every endeavour must be made to protect the trees from its effects, both by the planting of shade trees and by the establishment of permanent wind-breaks. For the latter purpose kapok-trees and bananas are very suitable; also, when clearing scrub lands, strips 2 or 3 chains in depth may be left standing.

The cacao-tree demands regular moisture, and in districts where the rainfall is too small or too irregular, cacao-growing will not be successful. Amongst animal pests, rats and flying-foxes are the greatest trouble, and the only remedies are poison for the first and persistent shooting of the latter. Of insect pests the number is legion, and amongst them may be classed ants of various kinds, boring beetles which attack the trunk, roots, branches, and

fruit, caterpillars, and other leaf-eaters, &c. The war against insect pests begins in the seed bed, where the ants attack the seed. This may be overcome by mixing the seeds with wood ashes or lime. Even some plants are injurious to the tree; for instance, creepers and climbers of various kinds and of rapid growth in a damp tropical climate, which throttle the young trees and branches and so hinder their growth. In Ceylon the cacao canker caused great trouble to planters, and the importation of cacao seed from Ceylon was, in consequence, forbidden in many cacao-growing countries, especially in Samoa. Fungoid growths also are to be guarded against. The trees are subject to a disease in the form of black spots or blotches on the bark. These should be carefully cut out as they appear. The fruit also sometimes turns black, an effect attributed to a fungus. The dry nuts are also very subject to the attacks of insects.

FERMENTATION OF THE NUTS.

In some places where the cacao-growers do not aim at the highest market value, the pods are opened and the seeds removed, cleaned, and dried without any other preparation. The best kinds, however, undergo a certain amount of fermentation, before being subjected to the action of the sun as a final process to fit them for packing. The fermentation has to be carefully watched that it does not proceed beyond a certain point, as upon the curing depends much of the flavour and keeping qualities of the beans. By some growers the entire fruit is thrown into heaps, and the fermentation is permitted to take place before the seeds are removed, but the superior and more common method is to remove the seeds first. Even where this is done, the method of inducing fermentation differs. Some simply throw the beans into a heap, occasionally stirring them until they are considered ready for drying. Others place the nuts in holes, cover them with sand, and stir them at intervals, fresh sand being added until all the moisture is absorbed. Care must be taken that the beans are of equal ripeness, as the unripe seeds have a bitter flavour, which the curing does not remove, and the presence of even a small number of green seeds will depreciate the quality of a whole crop. In Trinidad the fermentation is done by what is known as the "Strickland Method," which, shortly, is as follows:—

Three cemented boxes or tanks of equal size are placed on a stand. Each tank is about 10 ft. long, 6 ft. wide, and 5 ft. deep, and all are beneath a zinc roof, which admits of the passage of air. They are cased with closely-fitting boards, and between the casing and the cement walls a hollow space of a couple of inches is left. To facilitate the escape of moisture both the wooden and the cemented floors are made sloping. Parallel to each other in the opposite walls, and at distances of 4½ and 10 in. above the bottom, are two rows of six holes each, a little over 2 in. in diameter. Two opposite holes are connected by a hollow bamboo, which also has a number of small holes about 2 in. apart in its entire length. These bamboo pipes serve to renew the air in the tanks during fermentation. Each tank has a close-fitting cover. At the lowest point of the cement floor is a hole through which the water which escapes from the perforated wooden casing flows away.

During fermentation all openings in the bamboo pipes and also the overflow hole are first closed in No. 1 tank. Then it is filled to the top with cacoa beans; these are covered with banana leaves, and the cover is put on. When, after the lapse of twenty-four hours, a certain amount of heat has been generated, a bamboo in the upper row and one in the lower is opened (but not on the windward side), in order to renew the air in the heap of beans. By means of a thermometer the temperature is carefully watched that it may not exceed 43 deg. C. (109 deg. Fahr.).

On the third day the moisture collected on the bottom is allowed to run off, and the beans are put into No. 2 tank. There it remains for three days,

and the temperature is not allowed to rise higher than 47 deg. C. (116 deg. Fahr.). If this temperature is exceeded, it is reduced by opening one or more of the bamboo pipes.

Now the beans are removed to No. 3 tank, where they remain for four days at a temperature of 35 deg. C. (95 deg. Fahr.).

When shovelling the beans from one tank to the other, any which are stuck together must be separated. The shovels must be made of wood, as cacao is injured by contact with metal. After fermentation, the beans are dried on wooden floors or on barbecues, and means must be at hand to cover them up quickly in the event of a sudden shower occurring.

Properly fermented beans dry in favourable weather in from five to six days.

YIELD.

The yield of the cacao-tree depends entirely on the variety planted and on other influences, such as soil, climate, treatment of trees and fruit. According to Professor Dr. Preuss, a vigorous, mature tree will yield 2 kilos ($4\frac{2}{5}$) lb. of dried beans; in Surinam, Dr. Bartelinck puts the yield at $1\frac{1}{2}$ kilos ($3\frac{3}{10}$ lb.) as an average, but under the most favourable conditions good trees will yield from $3\frac{1}{2}$ to 4 kilos ($7\frac{7}{10}$ to $8\frac{4}{5}$ lb.). Taking 190 trees to the acre, the yield will be somewhere between 6 and 7 cwt. per acre. The present price of good and best samples is from 50s. to 70s. per cwt. The gross return would amount to from £15 to £21 to £24 per acre.

COST OF CULTIVATION OF PARA RUBBER, COCOANUTS, AND SUGAR-CANE IN THE FEDERATED MALAY STATES.

The following information as to the cost of establishing rubber and other plantations in the Malay States, has frequently been asked for, and now the same demand comes to us from intending planters in New Guinea. The figures here given show the cost of clearing and weeding to be somewhat less than the same work can be done for in Papua, but as a whole the total expenses approximate those of the latter territory. Note that the dollar in the Malay States is equal to about 2s. 4d. of English money. It should also be noted that the price of Parà rubber is given as 3s. per lb., whereas the present price is quoted at from 6s. to 10s. per lb. We take the figures from the "Agricultural Bulletin of the Straits and Federated Malay States."

PARA RUBBER CULTIVATION.

ESTIMATE FOR 1,000-ACRE ESTATE; 250 ACRES TO BE OPENED EACH YEAR.

First Year.	$
Premium	3,000
Survey fees	1,000
Rent	1,000
Clearing, felling, and burning 250 acres ($15 per acre)	3,750
Lining, holing, and planting 250 acres ($6 per acre) ...	1,500
Plants	800
Roads and drains ($6 per acre)	1,500
Bungalow	2,000
Lines	1,500
Medical—Hospital, medicines, &c.	2,000
Labour—Advances, immigration fees, &c.	1,500
Superintendence	3,600
Tools and sundries	1,000
Total	24,150

Second Year.

	$
Rent	1,000
Clearing, felling, and burning 250 acres	3.750
Lining, holing, and planting 250 acres	1,500
Plants	800
Roads and drains	1,500
Medical	1,000
Labour	1,000
Superintendence	4,000
Tools and sundries	750
Weeding 250 acres	2,500
Supplying	100
Total	17,900

Third Year.

	$
Rent	1,000
Clearing, felling, and burning 250 acres	3,750
Lining, holing, and planting 250 acres	1,500
Plants	800
Lines	1,500
Roads and drains	1,500
Medical	1,000
Labour	1,000
Superintendence	4,000
Tools and sundries	1,000
Weeding 500 acres	6,000
Supplying	100
Total	23,150

Fourth Year.

	$
Rent	1,000
Clearing, felling, and burning 250 acres	3,750
Lining, holing, and planting 250 acres	1,500
Plants	800
Roads and drains	1,500
Medical	1,000
Labour	1,000
Superintendence	4,000
Tools and sundries	1,000
Weeding 750 acres	12,000
Supplying	100
Total	27,650

Fifth Year.

	$
Rent	1,000
Roads and drains	800
Medical	1,000
Labour	1,000
Superintendence	4,000
Tools and sundries	1,000
Weeding 1,000 acres	15,000
Total	23,800

Sixth Year.

	$
Rent	1,000
Roads and drains	800
Labour	1,000
Medical	1,000
Superintendence	4,000
Tools and sundries	1,000
Weeding 1,000 acres	17,000
Total	25,800

Seventh Year.

	$
Rent	4,000
Roads and drains	800
Medical	1,000
Labour	1,000
Superintendence	4,000
Tools and sundries	1,000
Weeding 1,000 acres	17,000
Total	28,800

8th and following years as 7th Year 28,800

With the exception that the cost of weeding gradually decreases till in the 11th or 12th year it is practically nil.

PROFITS.

Seventh Year.

	$
250 acres, planted 150 trees per acre, at 1 lb. rubber per tree, sold at 3s. per lb.	48,214
250 acres, planted 150 trees per acre, at 1½ lb. rubber per tree	72,321
Total	120,535
Less cost of production, shipping, &c., of 93,750 lb., at 1s. 6d. per lb.	60,268
Net profit	60,267

Eighth Year.

	$
250 acres at 1 lb. per tree and 3s. per lb.	48,214
250 acres at 1½ lb. per tree and 3s. per lb.	72,321
250 acres at 2 lb. per tree and 3s. per lb.	96,428
Total	216,963
Less cost of production, &c., 253,125 lb., at 1s. 6d. per lb.	108,482
Net profit	108,481

Ninth Year.

	$
250 acres at 1 lb. per tree and 3s. per lb.	48,214
250 acres at $1\frac{1}{2}$ lb. per tree and 3s. per lb.	72,321
500 acres at 2 lb. per tree and 3s. per lb.	192,856
Total	313,391
Cost of production, &c., 243,750 lb. at 1s. 6d. per lb. ...	156,696
Net profit	156,695

Tenth Year.

	$
250 acres at $1\frac{1}{2}$ lb. per tree and 3s. per lb.	72,321
750 acres at 2 lb. per tree and 3s. per lb.	289,280
Total	361,601
Less cost of production, &c., 262,500 lb., at 1s. 6d. per lb.	180,800
Net profit	180,801

Eleventh Year.

	$
1,000 acres at 2 lb. per tree and 3s. per lb.	385,710
Cost of production, &c., of 300,000 lb. at 1s. 6d. per lb.	192,857
Net profit	192,853

And so on each year, annual profit $192,853, with a probability of still increased yield.

ABSTRACT OF PROFIT AND LOSS.

	Expenditure. $	Profit on Rubber. $	Net Profit on Estate. $
1st Year	24,150		
2nd "	17,900		
3rd "	23,150		
4th "	27,650		
5th "	23,800		
6th "	25,800		
7th "	28,800 ...	60,267 ...	31,467
8th "	28,800 ...	108,481 ...	79,681
9th "	28,800 ...	156,695 ...	127,895
10th "	28,800 ...	180,801 ...	152,000
11th "	28,800 ...	192,853 ...	164,053
12th "	28,800 ...	192,853 ...	164,053

Expenditure with interest at 5 per cent. up to end of 6th Year $168,670 (£20,000)

Net profit on estate after deducting 5 per cent. interest on capital:—

		$	
Expended	7th Year	22,967	or 13 per cent.
	8th "	71,181	or 42 "
	9th "	119,395	or 70 "
	10th "	143,500	or 84 "
	11th "	156,553	or 92 "

And so in future years with a probability of increased yields.

	$		£	s.	d.
Capital expended	168,670	=	19,678	3	4
Profit	22,967	=	2,679	9	8
	71,181	=	8,304	9	0
	119,395	=	13,929	8	4
	143,500	=	16,741	13	4
	156,355	=	18,241	8	4

COCONUT CULTIVATION.

ESTIMATE FOR OPENING UP AND BRINGING INTO BEARING 500 ACRES.

First Year.

	$		£	s.	d.
Felling and clearing at $10 per acre	5,000	=	583	6	8
Draining at $12 per acre	6,000	=	700	0	0
Cost of seed (40,000 seeds at 8 cents each)	3,200	=	373	6	8
Fencing at $2 per acre	1,000	=	116	13	4
Lining and planting at $2 per acre	1,000	=	116	13	4
Cooly lines	250	=	29	3	4
Tools	250	=	29	3	4
Bungalow	1,200	=	140	0	0
Stationery and postage	50	=	5	16	8
Medical	50	=	5	16	8
Premium at $3 per acre	1,500	=	175	0	0
Quit-rent at $1 per acre	500	=	58	6	8
Weeding, 1st six months at $1 per acre per month	3,000	=	350	0	0
Contingencies	500	=	58	6	8
Superintendence	3,000	=	350	0	0
Total ...	26,500	=	3,091	13	4

Second Year.

	$		£	s.	d.
Quit-rent	500	=	58	6	8
Weeding	6,000	=	700	0	0
Superintendence	3,000	=	350	0	0
Total ...	9,500	=	1,108	6	8

Third Year.

	$		£	s.	d.
Quit-rent	500	=	58	6	8
Weeding	4,200	=	490	0	0
Superintendence	3,000	=	350	0	0
Supplying	300	=	35	0	0
Total ...	8,000	=	933	6	8

Fourth Year.

				£	s.	d.
Quit-rent	... ...	500	=	58	6	8
Weeding	... ...	3,500	=	408	6	8
Superintendence	... ...	3,000	=	350	0	0
Total	...	7,000	=	816	13	4

5th year, $7,000 (£816 13s. 4d.); 6th year, $7,000 (£816 13s. 4d.); 7th year, $7,500 (£875); 8th year, $7,500 (£875).

Estimated Returns.

6th year, 10 nuts per tree; 7th year, 30 nuts per tree; 8th year and afterwards, 50 nuts per tree.

Value of nuts, $20 (£2 6s. 8d.) per 1,000 nuts; 60 trees to the acre.

PROFIT AND LOSS.

	Expenditure.		Value of Nuts.						Profit on Each Year.		
	$		£	s.	d.	$		£	$		£
1st year	26,500	=	3,091	13	4						
2nd ,,	9,500	=	1,108	6	8						
3rd ,,	8,000	=	933	6	8						
4th ,,	7,000	=	816	13	4						
5th ,,	7,000	=	816	13	4						
6th ,,	7,000	=	816	13	4	6,000	=	700		=	
7th ,,	7,500	=	875	0	0	18,000	=	2,100	10,500	=	1,225
8th ,,	7,500	=	875	0	0	30,000	=	3,500	22,500	=	2,625
9th ,,	7,500	=	875	0	0	30,000	=	3,500	22,500	=	2,625
10th ,,	7,500	=	875	0	0	30,000	=	3,500	22,500	=	2,625

	$		£	s.	d.
Total expenditure in ten years	95,000	=	11,083	6	8
Gross value of produce	114,000	=	13,300	0	0

Percentage of annual profit to capital expended:

7th year	17·79
8th ,, ...	38·12
9th ,, ...	38·12
10th ,, ...	38·12

APPENDIX C.

SUGAR-CANE CULTIVATION.

ESTIMATE FOR OPENING UP AND PLANTING 1,000 ACRES OF JUNGLE LAND.

	$		£	s.	d.
Felling 1,000 acres at $10 per acre	10,000	=	1,166	13	4
Cutting second growth at $6 per acre	6,000	=	700	0	0
Burning and clearing at $6 per acre	6,000	=	700	0	0
Changkolling before planting at $5 per acre ...	5,000	=	583	6	8
Drainage before planting at $26 per acre ...	26,000	=	3,033	6	8
Canals for transport at $21 per acre	21,000	=	2,450	0	0
Lining and planting at $2·50 per acre	2,500	=	291	13	4
Housing accommodation on the basis of two labourers for every 3 acres in cultivation ...	4,500	=	525	0	0
Management charges	10,000	=	1,166	13	4
Total	91,000	=	10,616	13	4

WHEN TO HARVEST TOBACCO.

The expert in charge of tobacco experiment work of the Department of Agriculture, U.S.A., in the Connecticut Valley, Mr. John B. Stewart, writes as follows in the "American Agriculturist" on the subject of harvesting tobacco:—

From my experience I have found that it is best, especially in a dry season, to harvest the tobacco before it is too ripe. If rain should come to freshen the plants and start them growing let them stand until they are matured, otherwise harvest the tobacco before it starts to fire up in the field.

Much has been said during the past few years concerning the harvesting of tobacco by the priming method. Not a few farmers have experimented to a more or less extent with the method, which is the plucking of the leaves as they become nearly ripe, instead of waiting to cut the whole stalk. Some have made a success of it and others have not. The principal drawback to the method is, I think, the little knowledge we have of the proper stage of ripeness tobacco should acquire to be in its prime for harvesting in order to make the best quality of goods possible.

From my experience I wish to state again, as I have many times told the grower who would prime his tobacco, not to delay the harvesting until the tobacco is too ripe; better by far have it a little on the green side of the line. As soon as the leaves are matured, that is, have their growth, they should be harvested. The longer a leaf stays on a stalk after it has its growth, up to the time it starts to fire, the more solid matter it contains. If the leaf so loaded with solid material is cured on the stalk, a part of the solid material in the leaf is made soluble during the curing process, and transposed into the stalk, thus benefiting the leaf; if the leaf is primed in the field this source of outlet for the solid material is cut off, and the leaf cures down thick and boardy, instead of thin and elastic, as it does when harvested as soon as it has obtained its growth.

The general outcome of the experiments in the harvesting of tobacco by the priming method will, no doubt, in time, be the method practised, and in my opinion it is the way the tobacco should be harvested. But it will take time to solve the problem, so that every farmer can equip himself with the necessary knowledge as how best to handle the harvesting of his tobacco by this method, and the leaf dealers will have to become sufficiently familiar with the product so that they will appreciate its merits and pay accordingly.

In reference to the leaf method of harvesting tobacco, Mr. R. S. Nevill, Tobacco Expert to the Queensland Department of Agriculture, to whom we submitted the extract from the "Agriculturist," says he is quite in accord with the method therein advocated. The chief objection to the leaf method is the expense, which is considerably more than by the whole plant system, but, on the other hand, the leaf method gives a larger percentage of high-grade tobacco.

PARA RUBBER PLANTS.

The Department of Agriculture lately imported a quantity of Parà rubber seeds from Ceylon. These were sown at the Kamerunga State Nursery, at Cairns, and germinated freely, with the result that by the end of this month (February) the manager anticipates that from 7,000 to 8,000 healthy and hardy young plants, free from disease, will be available for distribution. The price, 3d. each, or 25s. per 100, is very reasonable, considering that intending rubber planters in North Queensland may obtain plants almost at their own door, thus avoiding the risk of loss by themselves importing seeds from other rubber countries. What that risk is we were enabled to verify on a rubber estate in Papua lately, where we saw a consignment of 150,000 seeds from the Straits Settlements, of which not one in 500 was sound. The plants at Kamerunga will be properly packed and delivered, f.o.b., at Cairns.

Animal Pathology.

VERMINOUS TUMOURS IN CATTLE.*

[The *Entozoon Spiroptera* (Onchocerca), sp.]

AUSTRALIAN LITERATURE.

By HENRY TRYON, Entomologist, &c.

The parasite—a nematode worm *Spiroptera sp.*, associated with the "worm-nest tumours" referred to by Dr. J. A. Gilruth (in his letter to Mr. P. R. Gordon, dated Melbourne University, 19th October, 1909), as having been met with in the Melbourne abattoirs in animals "from Queensland or that direction originally"—is doubtless the entozoon associated with the so-called "white kernels" affection of our cattle, an occurrence that—as there are grounds for concluding—may also be noted with respect to cattle both from New South Wales and Western Australia, and that is constituted by nodules, especially in the neighbourhood of the brisket, but in other places as well.

The following is a summary of the Australian literature relating to this matter:—

(1.) 1880, Morris (Dr. William).—"Dr. Morris read some notes on an encysted filaria found in the flesh of a bullock, and exhibited the cyst and portions of the mature and embryo worm under the microscope. The cyst is formed of dense white fibrous tissue encased in which is found the mature worm with interlaced meshes of tissue corresponding with the folds of the worm. The cyst is about the size of a Barcelona nut, and may contain more than one mature worm, which worm is completely filled with encapsuled and free embryos. It is impossible to ascertain, with any degree of certainty, how many embryos each mature worm may contain, but they may be numbered by hundreds of thousands."—"Proceedings Royal Society of New South Wales," XIV. (1880), page 337, Sydney, 1881.

(2.) 1892, Gibson (Dr. ——).—"Notes on certain worm nests occurring in the cellular tissue of the brisket in cattle." An account of "Spiropteric tumours," known to butchers as "white kernels," associated with tuberculosis.—"Report Intercolonial Medical Congress of Australia, 1892."

(3.) 1892, Bancroft (Dr. T. L., M.B., Edinb.).—"There were present in several oxen in Brisbane and Rockhampton the worm tubercles first noticed by Dr. Morris, of Sydney (Royal Society, New South Wales, Vol. XLV. (XIV.) page 337), and since by my father (late Dr. J. Bancroft, H.T.), and others. It seems impossible to extract from these growths worms sufficiently unmutilated to serve for description. Judging from the small pieces, this worm appears too coarse in structure to be a Filaria, and probably belongs to the genus Strongylurus."—"Notes on Some Diseases in Stock in Queensland," Brisbane, 23rd November, 1892, in Report of the Chief Inspector of Stock and Brands for the year 1892, page 4 (Appendix); Brisbane; by Authority, 1893. (P. R. Gordon.)

(4.) 1893, Park (Archibald, M.R.C.V.S.).—Report to Chief Inspector of Stock (P. R. Gordon). (NOTE.—This is dated Hobart, 1st August, 1893, and is the outcome of investigations carried out 24th May to 4th July, at Boondooma Station, Upper Burnett, under the auspices of the Government of Queensland.

* This is the text of a Memorandum (Department of Agriculture and Stock, Brisbane, 5th January, 1910) compiled by the writer at the special request of the stock division. Special interest at the present time attaches to it, since the parasitic disease to which it relates has been detected in meat on its arrival in England, and is now engaging the attention of parasitologists there.—H.T.

—H.T.) The initial paragraph (not printed) of the report reads:—"I have the honour to submit to you a report of my recent investigations in the Burnett district of Queensland, initiated for the purpose of ascertaining whether tuberculosis of oxen is (be) a disease of domestication. I was engaged," &c. Appended is a tabulated account of 73 *post-mortems* and description of 15 microscopical preparations.—H.T.) "I was engaged from 22nd May until 4th July, and made sufficient observations and obtained morbid material to prove that there is very little tuberculosis in the Burnett, but there is a great deal of a disease which has been mistaken for it: I refer to the worm tubercles caused by the *Spiroptera reticulata*. I was detained fully a month, and consequently many specimens were lost on account of their bulk and difficulty in getting across country. However, sufficient has been saved to fully prove that the amount of tuberculosis in this district is not such as to create alarm; in every instance where tubercle bacilli are found, I find the *Spiroptera reticulata* has always invaded the tissue involved. You will observe that I have applied the term 'cystic' in preference to tubercular tumours, as all the lesions are contained within a cyst, no matter how small the nodule may be. They may coalesce, and do so until a small number of nodules become as large as a skittle pin, assuming much the same shape or lobulated like a kidney. They may be found in any part of the body, but always in connection with the lymphatic system. The duration of growth is at present uncertain; in some (cases) it appears rapid; and in others several years apparently elapse. Age is no guide or protection against invasion; two years old are as liable as five, six, or ten years old. Many of the cases were, upon microscopical examination, found to be affected with several diseases, such as actinomycosis, cystic tumours containing tubercle bacilli and dead Spiroptera. In the adult and young stages of the parasite, even the outline of the dead encapsuled embryo could be distinctly made out. On further examination of the pus, complete spirals of the adult parasite, that had become calcareous, could frequently be found. Having thus obtained a clue, I made cover-glass preparations by taking impressions from the pus and juice from the more vascular of the tumours. The latter were swarming with young Spiroptera in every stage of development, the pus clearly showing similar forms in a more or less degenerated condition. On staining for tubercle bacilli the same reaction appeared in both, except that no tubercle bacilli were found amongst the young Spiroptera, but a condition in the young parasites breaking up into fragments almost in some instances identical like (to) tubercle bacilli, the encapsuled embryo would appear with methylene-blue exactly like a giant cell or a multi-nucleated cell when prepared fresh; but when kept in alcohol these conditions were not too well seen; they then resembled the degenerated fragments seen in pus. It is quite clear to me that we are dealing with a parasitic disease that is the primary cause of tuberculosis in Queensland cattle known as 'lumpy throat,' &c, &c., caused solely by this *Spiroptera reticulata*. *Spiroptera reticulata* has not been described by any authority as invading 'bovine' tissue, and (owing to) the difficulty of extracting a whole parasite in the adult stage, I can only give an imperfect outline of it. About 2 inches is the greatest length I have been able to extract, and then the intestinal canal and oviducts are broken a considerable distance from the body of the parasite, which is armed with serrated edges along the body, in some parts striæ run alternately across the body a little beyond the median line; at another part run from side to side. These striæ are spiral, and would admit of the body expanding or contracting considerably, and favour the twisting and winding the parasite seems to undergo in the lymphatic tissue. The oviducts appar to be two; one generally contains free embryos, the other encapsuled ones. These latter are extremely interesting, as the development can be seen going on very rapidly from the ova to the viviparous stage, when hundreds of these young embryos can be seen wriggling in the field of the microscope. They are extremely prolific, as many hundreds can be procured from a single drop of fluid. As already stated, the pus proves this fact by the

amount of worm débris seen in it. How the parasite enters the body, or the duration of life, has not yet transpired; but it seems clear it must enter by the intestinal canal and find a nidus in the lymphatic glands and vessels. The most favourable position to find the live Spiroptera is generally beneath the *paniculus carnosa*, or the pectoralis muscle. In the throat and other parts, the parasite is generally dead before attention is attracted, and these then are called tubercular or 'lumpy.' To enter into minute details of every case examined is not necessary, nor is it desirable in a report of this kind; it will be sufficient if I prove the facts, as stated, that the tuberculosis of Queensland is so far only a secondary condition existing after invasion by the parasite above named. Accompanying this report are slides showing the Spiroptera in all stages of development, accompanied by tubercle bacilli in the degenerated tissues, 'clearly showing that tubercle follows Spiroptera, but Spiroptera never follows tubercle,' a still further proof that some lesion must exist before tuberculosis can develop. Let us now select a few of the more important cases to examine in detail, taking the numbers on the list appended." He detailed particulars, regarding seven cases, and then passes on to refer to diseases in cattle (actinomycosis and tuberculosis especially) and their relationship to the wholesomeness of the meat that an animal affected by them yields.—H.T.). "Diseases in Cattle," Brisbane "Courier," 23rd August, 1893. Brisbane Evening "Observer," 31st August, 1893. The "Queenslander," Brisbane, Vol. XLIV., No. 935, p. 746-7, 12th September, 1893. **1893, Park (Archibald, M.R.C.V.S.): "Parasitic Diseases in the Colony of Queensland." [Report dated August], "Veterinary Journal and Annals of Comparative Pathology," London, (222) V. 37, December, pp. 102-7, 1893.**

(5.) 1893, Stanley (E., Government Veterinarian, New South Wales).—"Tumours from the brisket of a fat bullock containing Filaria-oviparous." "Report to Board of Health of New South Wales, July, 1893" (embodying outcome of investigations made by C. J. Pound, Bacteriologist).

(6.) 1893, Park (Archibald, M.R.C.V.S.).—"Spiroptera in Cattle." The writer in this meets a criticism on the part of the Government Veterinarian of New South Wales (E. Stanley), made in September, 1893, and embodied in a letter to the Chief Inspector of Stock of Queensland (P. R. Gordon). In this he intimates:—

(1.) That the subject of Dr. Gibson's communication to the Intercolonial Congress corresponded to that which had been the object of his own report to the Queensland Government: "I found the worms to be identical with those I had found in Queensland, and had previously reported on."

(2.) That this applies also to Dr. T. L. Bancroft's investigations, with whom he had conferred.

(3.) That the deep-seated cystic or tubercular tumours that constitute the "lumpy throat" of Queensland cattle, and that had been principally under consideration in his August Report, were identical in origin with the superficial ones, "worm nests," treated of by other investigators, remarking in this connection as follows:—"No notice was taken by me [relating to his earlier investigations] of the worm nests in the brisket and superficial parts of the body, although I informed Mr. G. Munro (of Boondooma Station) what they were"; and, "unfortunately, a number of cattle had been examined without the skin having been removed before my attention was directed to the parasite in association with tubercle, after which I obtained conclusive evidence that the parasite had preceded the tubercular lesions. I have since abundant evidence in the same direction from the largest to the smallest tumours examined."

(4.) That he had "sent sections and tissue of various degrees of development and degeneration to London for examination, by the

last mail," and that he had "unexpectedly received a letter from one of the best pathologists in England, connected with the British Institute of Preventive Medicine, containing an offer to assist me [him] in the important inquiry."

(5.) That the specific name "reticulata," that he had applied to the parasite did not imply any suggestion on his part that the cattle Spiroptera and the horse-loving species of this genus were identical. "I gave the name 'reticulata' from the reticulate appearance of the tissue." (Letter to Editor.—"Spiroptera in Cattle"). Brisbane Evening "Observer," 7th November, 1893, and Brisbane "Courier," *ib.* The "Queenslander," Brisbane, 1st November, 1893.

(7.) 1907, January, Cleland (J. Burton, M.D., Ch.M. Syd., &c.).—"Spiroptera nodules are common in cattle, embedded in the muscles." "The Diseases of Animals and Meat Inspection in Western Australia." Australian Association for the Advancement of Science, January, 1907, in Journal of the Department of Agriculture, Western Australia. XV. (1907), 84-94; op. cit., p. 88.

(8.) 1908-9, Pound (C. J.), reports as having received for examination amongst other objects "Spiropteric tumours." Report of the Director of the Stock Institute, in Report, Department of Agriculture, 1908-9, page 97 (8to edition).

Note.—"White kernels" of the abattoirs of Queensland have for some years past been regarded by the Veterinary Branch of the Department of Agriculture and Stock as being associated with the presence of a definite species of Spiroptera—*i.e.*, *S. reticulata*, the well-known entozoon of the horse. It is now ascertainable to whom definitely this nomenclature is due.

(Signed) HENRY TRYON,
Government Entomologist and Vegetable Pathologist.

P.S.—In preparing the foregoing summary, the writer's indebtedness for the assistance of Dr. T. L. Bancroft, M.B. Edinb., of Brisbane, is to be admitted.—H.T.

ADDENDUM.

Park (A., M.R.C.V.S.).—In a communication that Archibald Park addressed to George Munro, of Boondooma, dated 21st June, 1893, the former anticipates the contents of his report of 1st August, *id.*, in the following statement:—"From all sources seventy head of cattle [Mr. Munro, in his covering letter (21-6-93) to "The Queenslander" (accompanying the foregoing), remarked "seventy head of cattle have been operated on, being the gatherings ('wasters' or 'lumpies') from over 30,000 head, a very small percentage from such a number, and shows that this district, at all events, is pretty free from disease."—H.T.] have been operated upon. The result has been that several were tubercular in appearance, a large number actinomycotic, and others suffering from injuries or a combination of diseases. The most striking feature in the majority of cases was some prior lesion; and, why located in the lymphatic glands? The great similarity of tumours, from the size of a bean to between 4 lb. and 5 lb. weight, in various stages of development, induced me to spread pus on a slide, and examine a larger body of it than I would for microbes. Seeing what appeared to be calcareous fragments of an animal parasite, my attention was directed to finding, if possible, the live animal in tumours of less advanced degeneration, and I have found large numbers of parasites in these 'lumpy cattle,' and, in my opinion, they are the main cause of the so-called tuberculosis in Queensland cattle." . . . "I am decidedly bound to say that animal parasites produce the primary lesion for the introduction of the specific micro-organism to develop either of the diseases named." ("Tuberculosis or What?") "The Queenslander," Brisbane, XLIV., No. 928, p. 118, 15th July, 1893.

SPIROPTERA RETICULATA.

Stock Experiment Station, Yeerongpilly, near Brisbane,
5th January, 1910.

SIR,—I have the honour to acknowledge the receipt of your communications dated the 29th and 31st ultimo relating to the presence of parasitic nodules in Queensland cattle.

These nodules are of very common occurrence in cattle in this State. They are caused by a worm which has been termed "*Spiroptera reticulata,*" although it has not yet been identified with the worm of the same name found in horses. It does not affect the health of cattle in the least. The worm nodules are chiefly found situated in the sub-cutaneous and inter-muscular connective tissues, their favourite site being in the brisket. They are composed of a very dense circumscribed covering of fibrous tissue, in the centre of which is found the worm or worms coiled up in a very dense felted mass. The life history of this worm is unknown, and attempts to dissect out a complete worm from the nodule have hitherto been unsuccessful. At times the worm apparently dies, and the contents of the nodule may them become calcified; such nodules may then be mistaken by an inexperienced person for tuberculous lesions—in fact, I have had such specimens submitted to me as evidence of tuberculosis, and therefore lax inspection of the carcass.* Sub-cutaneous nodules, and indeed everyone that can be discovered during the routine inspection of a carcass, should undoubtedly be removed; but there are cases where the nodules are so deeply situated that it is impossible to discover them except by cutting up the flesh in such a way as to spoil it for market purposes. These deeply seated nodules, although as a rule few in number, would, of course, be discovered when the meat was cut up into small joints for retail sale, or when being partaken of by the purchaser.

Portions of carcasses in which the nodules are very numerous should certainly not be passed as first-class meat, because the presence of so many in the meat is repulsive to the consumer.

With regard to the presence of this parasite from a public health point of view—provided the number of the nodules is not great, and that the portions of tissue immediately surrounding them are removed—I am of opinion that the presence of this parasite does not exert any deleterious influence on the meat, and that such meat can be passed as fit for human consumption. As a matter of fact, the Medical Officer of Health for London acknowledges this, but in rather an ambiguous manner. He states: "The portions of meat containing the parasite are obviously unfit for food and should be destroyed"; and, further on, "Where it is possible the parasite is removed with a small portion of the surrounding tissues, the rest of the meat being passed as fit for food."

There is one paragraph in Dr. Collinridge's letter which seems to indicate a need for inquiry here. It is:—"In some cases these organisms are so numerous that their removal would practically leave nothing, in which case the whole of the meat is condemned." As before stated, meat in such condition should certainly not be passed. About a year ago I warned one or two exporters and also inspectors of the necessity of being careful with regard to this worm nodule in carcasses, as their presence would probably result in the flesh being condemned in London by inspectors who have no practical acquaintance with the parasite.

Dr. Collingridge also acknowledges that the parasites are confined to certain parts of the body, and that he has arranged to thaw and inspect the flanks and briskets only. I trust that this does not mean that, if these parts are found infested, the rest of the carcass is condemned also, because this would be manifestly unjust, as the great probability is the other parts would be quite free from parasites.

*Mr Dodd, in a further communication to the Department, in answer to inquiries in connection therewith, explains that the lax inspection abovementioned does not refer to any action by the Inspectors of the Department.—Ed. Q.A.J.

I am writing an article on this subject to some of the professional papers, and the matter will thus be brought directly under the notice of veterinary meat inspectors in the United Kingdom, &c.

I have, &c.,

S. DODD, F.R.C.V.S.,
Principal Veterinary Surgeon and Bacteriologist.

The Under Secretary, Department of Agriculture and Stock, Brisbane.

SPIROPTERA RETICULATA (?) IN CATTLE.

BY SYDNEY DODD, F.R.C.V.S., Principal Veterinary Surgeon and Bacteriologist, Queensland.

In two recently published works upon parasites of the domesticated animals—viz., "Neuman's Parasites," 2nd edition, 1905, and Law's "Veterinary Medicine," Vol. V., 2nd edition, 1909—it is stated that *Spiroptera reticulata* is not known in any other animals than equines. Whether this is absolutely correct or not, the fact remains that for years parasitic nodules have been known to exist in cattle in Australia containing a worm which has been termed *Spiroptera reticulata.* It has been mentioned in the "Queensland Agricultural Journal" under the name of "Worm Nests," but so far I have been unable to discover any mention of it in veterinary literature; and there is a probability that it has not been described heretofore in the latter, as otherwise Professors MacQueen and Law, who are both known as careful and well-read authors, would have made some mention of the fact. Neither is any mention made of such an occurrence in Ostertag's "Meat Inspection," third edition. However, be this as it may, the presence of this parasite has become one of some importance to the export meat trade of Queensland, owing to expansion in such trade to the United Kingdom and the inspection of meat in connection therewith.

The parasite in question is very common in Queensland cattle, but it appears to be seen most frequently in cattle from the Western plains. Its presence is seldom diagnosed during life, it being chiefly seen in the slaughter-houses during the inspection of the carcass. The probability is that its presence when it is merely sub-cutaneous could readily be ascertained by palpation during life, but such close *ante-mortem* inspection of cattle which have seldom or never been handled is not often practicable. The parasite is made evident to the touch by the presence of very firm nodules, which when superficial feel like fibromata. They vary in size from that of a black currant up to that of a walnut or even larger. Their favourite site is in the sub-cutaneous or inter-muscular connective tissue. The brisket and flanks appear to be the chief parts invaded, although they may occur in connection with the muscles and connective tissue of any part of the body, and in very deep-seated situations. The nodules are quite circumscribed, and I have never seen any signs of acute inflammation due to their presence. On dissection it will be found that the nodule has a very dense hard covering of fibrous tissue, whilst internally and occupying a varying amount of space is the parasite. At times the wall of the nodule, although very dense, is relatively thin, and the space occupied by the parasite, or parasites, relatively great. At others the nodule may be almost entirely composed of the dense fibrous capsule.

The parasite within the nodule is found to be arranged in a dense felted mass, so intimately entwined within itself, or the connective tissue fibres,

that it has hitherto beeen found impossible to dissect out a complete worm. (Compare *Sp. reticulata* in the horse.) I have made many attempts to obtain a complete worm from both fresh and preserved specimens, but have so far failed. When cut with a knife, it has a grating sound, as when cutting tendon. A section through such a nodule will show numerous "pin point" areas (the transverse section of the parasite) and a few short lengths of the worm embedded in fibrous connective tissue. The average thickness of the sections of worm obtained have been about that of a fine pin.

At times the parasite dies, and the interior of the nodule becomes calcified. When it is being cut it has a "gritty" feeling. Such a nodule might be mistaken by an inexperienced Inspector for a tuberculous lesion, and, indeed, I have had several pieces of meat containing such nodules submitted to me as evidence of tuberculosis, and therefore of lax inspection; a careful examination, however, of the nodule should not result in such an error.

I have never met a case where the contents of a nodule have undergone degeneration and softening or caseation, but there is a possibility of such an event occurring, and in such a case probably microscopical examination might be necessary to determine the exact nature of the lesion.

The presence of these parasites, even though they may be very numerous, does not occasion any injury to the health of the host. Animals in the pink of health and condition may be found to harbour them just as frequently as poor cattle.

The life history of the worm is unknown; consequently one is unable to say how cattle become infected, whether by means of the alimentary canal, or by direct inoculation of the sub-cutaneous tissue. However, Dr. G. Sweet, and Professor J. Gilruth, of the Melbourne University, are about to undertake some research concerning the *S. reticulata* in cattle; and it is hoped that light will be thrown on the subject.

With regard to the importance of the presence of the parasitic nodules from a meat inspection and public health point of view, the question will bulk more prominently during meat inspection in the metropolis and other important centres in the United Kingdom, as, owing to the recent success in shipping chilled meat from Queensland to London, the trade in Queensland beef is likely to be greatly increased in the near future.

It has already been stated that the health of the animal is not affected by the presence of the worm. The flesh of such animals has been consumed for years, and there is not a scrap of evidence to show that it is injurious to human beings; and I am of opinion that, provided the nodules are not numerous, such meat may be safely passed for human consumption, after the nodules have been removed from the part. Where, however, such nodules are very numerous, the part affected should be condemned for obvious reasons, but even then the remainder of the carcass may be quite fit for consumption.

At the place of slaughter, lesions which are discoverable during inspection should be removed. If the nodules are numerous, the portion of the carcass affected should not be passed as first-class meat. It is evident, however, seeing that the nodules are sometimes embedded deep in the carcass, that even inspection by the keenest inspector will fail to reveal these deep-seated nodules, and examination of all carcasses for such nodules is impracticable, as it would result in the disfiguring of the meat and rendering it unsaleable to the trade. It is evident, therefore, that cases will occur in the cutting up of a carcass where a nodule has escaped the attention of an inspector owing to its inaccessibility. In such an event I think that the needs of the case would be met by the removal of the nodule.

NOTE.—Mr. Dodd, in a further communication to the Department, in answer to inquiries in connection therewith, explains that the lax inspection abovementioned does not refer to any action by the Inspectors of the Department.—Ed. Q.A.J.

REPORT ON EXPERIMENTS WITH THE WILD PASSION FLOWER VINE IN CONNECTION WITH THE DEATH OF CATTLE IN THE BEAUDESERT DISTRICT.

By SYDNEY DODD, F.R.C.V.S., Principal Veterinary Surgeon and Bacteriologist.

For a number of years, especially during the dry season, considerable loss has been sustained by cattle-owners in the scrub belts near Beaudesert owing to the death of numbers of their stock, both in milking herds and in working bullocks.

According to the Stock Inspector's report, the trouble has occurred year after year, and a large number of the cattle have died every year from some unknown but apparently identical cause, as the symptoms shown by affected cattle had a great similarity. Since September of this year, 1909, twelve had died in one district to his personal knowledge. I subsequently found that others had died elsewhere during the same period. There is no doubt that the financial loss has been very heavy to some owners, as, especially where working bullocks were concerned, even if the affected animal did not die it was often impossible to work it for some time afterwards, and even then a relapse very often occurred. The reason for this latter will be seen later on. So far as I have gathered, only cattle have been affected, but this, as it will subsequently be seen, may be chiefly because the cattle have had the greater opportunity to graze upon land where the causal agent is existing.

The symptoms, as described by stockowners, appeared to differ somewhat in individual cases, but, on comparing the average symptoms on one farm with those shown on another, it could be seen that there was a great similarity between the various occurrences, the difference in mortality being most noticeable between milking cows and working bullocks, it being heavier in the latter. In one instance, on a dairy farm, the cows when being driven in to be milked, were observed to stagger, drop to the ground suddenly and struggle very much whilst down. Sometimes the affected animal would have only one fit, at others convulsions followed rapidly upon each other with only a short interval between. One cow died within fifteen minutes after the seizure. Another was apparently quite well one afternoon, and within half an hour after this it was stretched out upon the ground in violent convulsions. It died in less than half an hour in the midst of a seizure. As a rule, however, the animals did not die during the first attack. In other cases the chief symptoms observed were that the cows gradually ceased to yield their usual quantity of milk. They would stand about the paddocks in a listless attitude with their noses held close to the ground. The main feature in these cases appeared to be great drowsiness, as if under the effects of a narcotic, and an evident loss of condition. Some animals recovered, whilst others died.

Other symptoms observed on other farms were that affected cows would stand constantly switching their tails and turning their heads round towards their flanks as if in pain.

In the case of working bullocks it was observed that animals which had hitherto been quite bright and intelligent at work, became drowsy and stupid, it being often only with difficulty that they could be got to perform their usual task. Others appeared to be attacked suddenly whilst at work. Without any warning they would suddenly drop to the ground in convulsions and, perhaps, die shortly afterwards. The general opinion, however, was that if the working bullocks were spelled for a time and put upon grass land, they appeared to make some recovery, but it was very slow and not always complete. Here, again, loss of flesh appeared to be a common accompaniment. In some cases the bowels were very constipated, in others diarrhœa was present.

At the end of September, 1909, the Stock Inspector at Beaudesert reported that some working bullocks were dying on a farm near that place.

The cause of the deaths was unknown, but poison was suspected, and the viscera from a dead animal was submitted to the Chemist for analysis, but no poison was detected. The symptoms observed in the affected animals were that they gradually fell away in condition and became very drowsy and sluggish at their work. Appetite was lost as a rule, and diarrhœa at times was marked. In the fatal cases the animal appeared to die in great agony and in convulsions. In other cases the illness appeared to last three weeks or even longer. A *post-mortem* examination was made by the owner on one animal, but nothing unusual was observed except that the paunch contained a quantity of wild passion flower vine. A small sample of this vine was forwarded in order to ascertain whether its presence could be connected with the death of the animal, as it grew profusely, and the cattle were known to graze upon it extensively. The specimen was submitted to Mr. Bailey, the Government Botanist, who identified it as the White Passion Flower Vine (*Passiflora alba*). He states that it is a native of Brazil, but it has now become a naturalised weed in Queensland. It is very plentiful in some of the scrubs. It had never previously been sent in as a suspected poisonous plant.

It was upon a farm adjoining the one in question, and upon exactly similar country, that heavy losses in cattle were experienced at the end of 1907, and also in September, 1908, but the owner attributed the deaths to arsenical poisoning as the result of dipping, although no arsenic could be discovered upon analysis. As the matter was urgent I arranged to visit the locality without delay in order to carry out investigations. Arriving at the farm, I was first shown some working bullocks which had been ill but were slightly better. They were then being kept in a small paddock close to the house, having previously been feeding in the scrub. They were very poor in condition and had a drowsy appearance. Two had evidently been affected with diarrhœa, but a third, I was informed, had been constipated. The owner stated that when some of the sick cattle were removed from the scrub and fed in the yard, they appeared to make some improvement.

An inspection was then made of the land upon which the cattle grazed. This was fairly recently felled scrub, showing a dense aftergrowth of young shrubs, and many weeds of various descriptions. It was soon made very evident that the cattle had been grazing upon a great variety of the weeds which grew in profusion, so that there was nothing specially to indicate which weed, if any, was causing the trouble. The passion flower vine was very abundant. The owner stated that he knew the cattle ate considerable quantities of it, and it could be seen that the young succulent shoots had been grazed off. As circumstantial evidence in the shape of ingested vines in the paunch of the dead beast appeared to suggest this plant as the offender, it was decided to commence experiments with it. Arrangements were therefore made to obtain a fresh supply of vines every morning. These were cut the previous evening and were received at the Laboratory at about 10 a.m. so that they arrived in quite fresh condition. It was also arranged to feed other plants, should the vines prove innocent, but the following experiments show that it was not necessary to proceed any further.

FEEDING EXPERIMENTS WITH WILD PASSION FLOWER VINE (*Passiflora Alba*).

Experiment No. 1.

8th October, 1909.—Commenced feeding a heifer eighteen months old with fresh passion flower vines. The vines were weighed at first with the intention of ascertaining what amount, if any, was necessary to cause illness, but as the animal only ate the succulent tops and rejected the remainder it was found impracticable to ascertain with certainty what amount had been consumed. The animal was fed three times a day and no other food was given except where noted, but even then she did not take well to the vines, and only ate a small quantity daily.

22nd October.—Fourteen days from the commencement of feeding. Marked constipation, the fæces very scanty and hard. The heifer, which had hitherto been quite bright and healthy, appears slightly dull. Temperature and pulse normal. Loss of flesh evident, but this may be because of eating little food, not to the injurious action of the vines.

26th October.—Supply of vines ceased. Recommenced feeding with barley straw containing grain. Appetite is very poor, however. Previous to commencing the experiment she ate the barley straw with relish, but now does not appear to care for it.

27th October.—Animal dull. Has a drowsy appearance. Not easily disturbed. Marked constipation. Not feeding. Mucous membranes brick red in colour. Weak in hindquarters.

28th October.—Heifer very dull to-night. Eating very little. There is a profuse flow of frothy saliva from the mouth when masticating its food.

29th October.—Still very dull and listless. Fæces hard and scanty. Salivation marked. Eating very little.

30th October.—Marked pain over loins on pressure. Ptosis. General condition as before.

31st October.—Rumination ceased. Jugular pulsation, temperature and respirations normal. Animal appears more drowsy and dull.

1st and 2nd November.—Recommenced feeding vines. Heifer, however, partaken of very little.

3rd to 6th November.—Drowsiness and general weakness more marked. Animal remains for some time in whatever position it is placed. Its usual attitude is to stand against the side of the stall with its head almost touching the ground. Pulse slow but fairly strong. The flow of frothy saliva has been a marked feature every day. There appears to be some difficulty in swallowing. If slight pressure is put upon the loins the animal almost drops to the ground. Pupils contracted. The head was often turned round to the right flank as if in pain. The head being pressed to its side whilst the neck was quite rigid like in a tetanic spasm.

7th November.—The symptoms have suddenly become urgent and alarming. The animal having had several epileptiform fits during the day, the fits being immediately preceded by slight premonitory symptoms. At first there is a slight quivering of the eyelids, rapidly followed by a twitching of the face. Within a few seconds the animal, which has hitherto been standing very quietly, suddenly rushes backwards as far as its fastening will allow, then it falls over in convulsions, the whole of the body being markedly affected. The fit lasts about a minute and the attack suddenly ceases, the animal almost at once rising to its feet, although looking very dazed. After about an interval of one or two minutes, she has another seizure preceded by the same warnings as before. After a number of fits the attack passed, leaving the animal utterly exhausted and dazed. In the afternoon she lay down and could only rise with great difficulty.

8th November.—Animal still down and unable to rise. There are no distinct convulsions as yesterday, but there are tetanus-like spasms of the extremities. Head sometimes turned round and resting on right flank. Animal appears conscious, but unable to move. Mucous membrane congested. Pulse 76, weak. Respiration 40, and very shallow. Animal having become moribund in the afternoon was chloroformed to death and a *post-mortem* examination at once held.

Autopsy.

General condition: very poor. Immediately upon death about two gallons of greenish fluid ran from the mouth and nostrils.

Lungs.—Normal.

Heart.—Rather flabby, numerous hæmorrhages into endocardium of left ventricle. None into right ventricle or auricles.

Spleen.—Smaller than normal and very firm.

Liver.—A few signs of cirrhosis, but otherwise normal to naked eye.

Gall bladder.—Mucous membrane slightly congested.

Kidneys.—Congested. Rather firmer than normal. Capsule easily stripped off. A number of white infarcts, about size of a rice grain, scattered over surface of both kidneys.

Reticulum and Rumen.—Contains less than the normal quantity of ingesta and composed mainly of passion flower vine.

Omasum.—Contents scanty and very pultaceous.

Abomasum.—Mucous membrane slightly congested.

Intestines.—Contains very little ingesta. A few small patches of congestion in duodenum, but otherwise normal in appearance.

Lymphatic glands.—Generally somewhat congested.

Brain.—Normal in appearance.

Experiment No. 2.

Cow No. 8.—An aged cow, poor in condition, but very bright. Had been tested for tuberculosis, but gave no reaction.

2nd November.—Commenced feeding fresh vines. The amount given was not weighed and the animal ate them with avidity at first. No other food was given.

8th November.—Cow appears to be tiring of the vine. Is not eating so much and is leaving the coarser stalks. Slight constipation. A little dull in appearance and appears slightly weak in hindquarters.

8th November, 4.30 p.m.—Animal suddenly broke loose from the chain fastening it to the stall, and rushed madly down the stables; near the end of the passage it stopped short, staggered, and then fell backwards in convulsions. Fits then succeeded each other for about twenty minutes with an interval of a minute or two. The first premonitory symptoms of the onset of a fit were a quivering of the eyelids, then a sharp twitching of the face, and then rapidly following on a convulsion of the whole body. A second or two before the convulsions became general the cow endeavoured to run backwards, but almost immediately fell to the ground. Each fit lasted from about one to three minutes. During the interval between the convulsions the cow would either rise to its feet in a very dazed condition, or lie upon its side as if stupefied. After the final convulsion the cow rose to its feet. It was very weak and dazed, but made great efforts not to fall. Saliva ran from the mouth profusely and the cheeks were puffed out. Pupils were contracted. The tail was continually being switched to and fro.

6.30 p.m.—The fits have quite disappeared. Animal is standing with its head near the ground. Very dull; has not moved for some time.

9th November.—Cow drank a little during the night, but had refused food. Pulse 48, fairly strong. Very dull. Pupils contracted. Marked salivation, also a dirty slimy discharge from the nostrils. When taken into the yard its power of co-ordination appeared almost lost, the animal swaying and staggering about when it attempted to move. Appeared uncertain where to place its legs. Vision appears unimpaired, however.

Noon.—Animal very drowsy. Has been resting its head on a bar in front of the manger all the morning, making no attempt to move. Is indifferent to sudden noises. Pupils slightly more contracted. Motions slight and not very firm. Ruminating a little. Profuse salivation.

10th November, 9 a.m.—Animal continues very dull. No further fits. Has eaten nothing since 8th instant. Drinks very sparingly. No fæces passed since morning of 9th instant. Pulse 40, weak, but regular. Mucous membranes slightly injected.

2 p.m.—Cow eating a little, but is very drowsy. Appears to be falling asleep whilst eating.

5 p.m.—Animal feeding a little, but still very drowsy. Eyes swollen and suffused. Muffle dry. Has passed a little dung which is fairly hard.

11th November, 9 a.m.—General appearance of animal and the stall indicates that the animal has had some severe convulsions during the night. She is now, however, very dull and drowsy looking. Makes no attempt to move and appears to be falling asleep whilst standing. Slight jugular pulsation, frothing at the mouth very marked.

Noon.—Cow has had several convulsions this morning, each preceded by the usual warnings—viz., twitching of the eyes, then the face, then a running backwards rapidly followed by general convulsions. She is now quiet, but very exhausted.

5 p.m.—Condition remains practically the same, drowsy, &c. Very little food taken.

12th November, 9 a.m.—Animal in same condition. Very dull indeed, standing with head touching the floor of the stall.

Noon.—Not quite so drowsy. Cow now standing with its head thrust well forward. Pupils contracted. Pulse 72, weak. Appears to get a slight spasm of the neck occasionally.

2 p.m.—Salivation very marked. Animal turned loose into the yard. She makes no attempt to walk, but stands exactly in the same position as when freed. Appears to be falling asleep and almost falls down, only recovering by a great effort, and then lapsing into the somnolent state again.

5 p.m.—Returned to stall. Condition unchanged. Has eaten nothing since morning, when a very little vine was partaken of.

13th November, 9 a.m.—Pulse 72, weak. Marked jugular pulsation. Cow still very dull, but the drowsy appearance is not so noticeable. She is standing up, but is easily made to stagger by a slight push, and regains her equilibrium with great difficulty. There are slight general muscular tremors. The neck is contracted on one side so that its head is almost touching the right flank. There appears to be some abdominal pain, which, however, is not acute. Frothing from mouth marked, also a thick straw-coloured discharge from the nostrils. No fæces passed.

11 a.m.—Cow has had several fits, but is now recovered. She is now standing up, but in a semi-unconscious state and very exhausted. Whilst in this position she fell forward upon her head and remained thus for at least three minutes without moving, and then regained her feet with great difficulty.

Noon.—Cow down. Breathing stertorously. Comatose, slight muscular spasms of the neck. The animal died during the night.

A *post-mortem* examination was made at 9 a.m. the next morning, 14th November.

Autopsy.

General Condition.—Very poor. A number of superficial wounds upon hindquarters recived during the convulsions. Upon the body being lifted, about 3 or 4 gallons of yellow turbid fluid gushed from the mouth and nostrils.

Lungs.—Left apex shows a small area, about three inches in diameter, of fibroid pneumonia. A number of hydatids scattered throughout the lungs.

Lymphatic Glands.—Swollen and intensely congested.

Heart.—About four ounces of a clear straw coloured liquid in the pericardium. Numerous hæmorrhages upon the epicardium. A few hæmorrhages into the endocardium of right ventricle.

Spleen.—Normal.

Kidneys.—Very congested.

Liver.—Congested, slightly cirrhotic. Numerous angiomata.

Bladder.—Urine of a reddish tint.

Stomach.—Normal. Rumen contained a quantity of passion flower vine.

Intestines.—Recent hæmorrhages scattered throughout. The large colon, cæcum, and rectum show marked evidence of very extensive old hæmorrhage along the course of the blood vessels.

Brain and Spinal Cord.—Very congested.

The foregoing experiments leave no room for doubt that the passion flower vine was responsible for the illness and deaths among the cattle where the investigations were made and that it has been the cause of a great deal of the illness among the cattle of that district. One feature brought out by the experiments is of great interest, and that is, the poisonous property of the vine is of a cumulative nature, and that evidently a certain amount of the material must be eaten before symptoms of poisoning are made manifest. In the first experiment the animal ate very sparingly of the vine and consequently marked symptoms did not develop until about twenty days afterwards, and the convulsions not until nearly a month from the commencement of feeding. The other symptoms, however, were shown on the fourteenth day, but in cases where cattle would be grazing in a paddock, these would in practice often be overlooked by the owner.

Treatment.

It is very obvious that so long as the animals are continually eating the vine, curative measures are only of temporary value. Hence the fact that when cattle apparently cured are turned out again into their old feeding grounds relapses, or, rather, fresh poisoning occurs. The first measures, therefore, should be taken to prevent the cattle gaining access to the vines. On farms where grazing land is scarce, efforts should be made to get rid of the injurious weed by cultivation or otherwise. This is by no means an impracticable task. The vine grows most luxuriantly in the newly felled scrub, and such land is useless until such noxious weeds have been eradicated.

With regard to treatment of affected animals, first remove them to fresh quarters so that they are unable to obtain any more vines. If there is no difficulty in swallowing they should be then given a drench of 1½ pints of linseed oil, by the mouth, in order to loosen the bowels. Epsom salts are not advisable, as in some cases there is inflammation of the bowels present. Working bullocks should be spelled until recovered. With animals in what may be termed the first stages of the disease, that is, those showing drowsiness and stupor, loss of appetite, and condition, &c., the best remedy is the injection of 18 drops or 1 c.c. of one per cent. solution of strychnine under the skin behind the shoulder, once a day for a few days (four or five) by means of a hypodermic syringe. For animals in the later stages, that is, where convulsions are appearing, a sedative in the form of 6 drachms of bromide of potassium in a pint of water should be given as a drench, providing the animal is able to swallow, but it appears that in some cases this ability is lost. In such cases no drenches should be given at all, owing to the danger of the liquid "going the wrong way," and so setting up inflammation of the lungs. The strychnine should be recommenced when the convulsions have disappeared.

General Notes.

TO MEASURE THE CONTENTS OF A KETTLE.

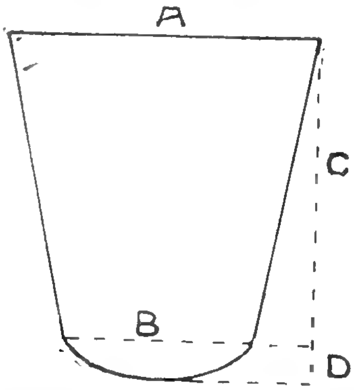
A correspondent of the "Scientific American" sends the following formula for calculating the capacity of flat or round bottomed kettles. He says:—In businesses using large quantities of liquid mixtures there is often occasion to find the content of a kettle or other round vessel, or to find the number of gallons in any such kettle when the contents are of a known depth.

I send you a formula which I have found of use in such cases. With it the labour of computing is, I believe, reduced to a minimum. If you consider it worthy of publication, I have no doubt it will prove helpful to many of your readers.

To find the capacity in gallons (of 231 cub. in.) of any vessel having straight sides (either convergent or divergent) having a circular horizontal cross section, and having a flat, spherical, or spheroidal bottom, the formula—

$$\frac{3\,C\,(a+b)^2 + 8\,D\,b^2}{3529}$$

equals the capacity in gallons.



The measurements here are all in inches. In case the vessel has a *flat* bottom, the second term in the numerator of the fraction disappears.

The formula given above is an approximation, perhaps close enough for factory use, but in any special case the result obtained from its use will very somewhat from the correct gauging of the kettle. It would seem to be better to gauge a new kettle before it is put into use, by measuring the depth for each unit of quantity of water used in filling it.

The table of these results kept near the kettle will enable the workman to work with accuracy and without the trouble of making any calculation in order to find out the quantity of liquid in the kettle. He will only need to measure the depth of the liquid in the vessel, refer to the table, and against the depth read the quantity in gallons or any other desired unit. Much time and labour in the laboratory may thus be saved.

The above formula is certainly a funny one; but, on the whole, it is approximately right, and was probably arrived at as follows:—

Given volume in gallons of the kettle =

$$\frac{3\,C\,(a+b)^2 + 8\,D\,b^2}{3529}$$

(*a*) When the botton is round;

(*b*) Second term of numerator disappears when bottom is flat.

N.B.—An American gallon = 231 cubic inches.

(1st.) Volume of upper part, *i.e.*, frustum of cone, will be approximately equal to the volume of cylinder of the same height whose diameter is the mean between a and b—

$$\text{That is } \pi \left(\frac{a+b}{4}\right)^2 C \times \frac{1}{231} \text{ gallons.}$$

$$= \frac{\cancel{22}}{7}\frac{2}{} - \frac{(a+b)^2}{\cancel{16}\,8} \times \frac{C}{\cancel{231}\,21} = \frac{(a+b)^2}{1176} = \frac{3\,(a+b)^2\,C}{3 \times 1176} = \frac{3\,C\,(a+b)^2}{3528}$$

(2nd.) The volume of the curved part of the kettle below the frustum—Assuming the curved part is a hemisphere, its volume will be $\frac{2}{3}$ of the volume of the cylinder whose base is b and height D—

$$\text{That is } \frac{2}{3} \cdot \left(\frac{b}{2}\right)^2 \cdot \frac{D \cdot \pi}{231} = \frac{2}{3} \cdot \frac{b^2}{4} \cdot \frac{D}{\cancel{231}\,21} \cdot \frac{\cancel{22}\,2}{7} = \frac{b^2\,D}{441} = \frac{8\,b^2\,D}{8 \times 441} = \frac{8\,b^2\,D}{3528} \text{ gallons.}$$

$$\therefore \text{Total volume} = \frac{3\,C\,(a+b)^2 + 8\,D\,b^2}{3528}$$

NOTE.—Since $\frac{22}{7}$ 3·1428, which is too great by ·0012, the denominator may be increased by $\frac{\cdot 0012}{3\cdot 1416}$ of itself, that is by ·0003 + of itself which = 1 + thus making denominator 3529 if $\pi = 3{\cdot}1416$.

Mr. R. H. Roe, Director of Education, says:—

There are two flaws in this formula—First, the volume of the frustum of the cone is not exactly equal to the volume of a cylinder of the same height with the mean diameter (as the formula assumes), but rather less; secondly, the sphereal portion at the bottom of a kettle is not usually a hemisphere, but only a segment of a sphere, less than a hemisphere.

∴ The whole volume given by the formula will be slightly too large.

RAINFALL AT WELLINGTON POINT.

We are indebted to Mr. W. Clowes for the following information concerning the rainfall on the south-western coast of Queensland:—From January to December, 1909, rain fell on 71 days. The greatest precipitation occurred in April, July, and December, when the fall amounted to 5·76 in., 3·24 in., and 7·46 in. respectively. The total for the year was 32·70 in. The remaining 294 days were excessively dry.

A NEW TOOL FOR CULTIVATING SUGAR-CANE.

The "Philippine Agricultural Review" says that Señor D. Viña, of Valle Hermosa, Oriental Negros, writing to the Secretary of the Interior, speaks of a new tool for cultivating sugar-cane:—

"About the 1st June I received a cultivator for sugar-cane, a rolling barrel and a 300-metre cable, which, attached to my traction engine, I have been using for cultivating my sugar plantations. This appliance is $3\frac{1}{2}$ ft. wide, and can easily pass between the rows of cane. It has five spikes or arms with five small teeth, which, without any difficulty, penetrate the soil from 15 to 18 in. As it is a single machine, it needs to be drawn across the field by an animal. In order to solve this difficulty, I contemplate ordering another cultivator of this kind, and will then attach a cultivator to each end of the cable, so that, as one comes across the field, the other may go, and, in this manner, it will be possible to do about 50 to 60 per cent. more work with little more expense. The sugar plantations worked with this cultivator appear to do better than the others. Thanks to these engines, and in spite of the many difficulties which have harassed us, we have the pleasure of showing an exceptional crop, compared with that of the plantations which surround us.

Answers to Correspondents.

CITRONELLA OIL—NITROGEN-FIXING BACTERIA.

CITRONELLA OIL.

H. HARVEY, South Kolan—

Citronella or Lemon Grass (*Andropogon nardus*) is a native of Bengal. From it is distilled a valuable scented oil which is used in the manufacture of soaps and other articles. In Java there are several large plantations of Lemon Grass, one or two covering 1,000 acres. If planted in good fertile soil, and enjoying a heavy rainfall, it grows very quickly. From 10 acres, a yield of 12 tons should be cut, and four crops can be taken off in a year, totalling 48 tons. This quantity will yield about $\frac{1}{2}$ per cent. of oil or $4\frac{4}{5}$ cwt., worth about £46 16s. The grass lasts twelve years before it is necessary to plant again. When first distilled, the oil is of a high colour, owing to the resin it contains, and in this stage it is known in the trade as lemon grass oil. By redistillation with charcoal, it becomes clear, and is then passed into consumption as "citronelle." Lemon grass oil is worth $2\frac{1}{2}$d. to 3d. per oz. Citronelle is worth about 1s. per oz., and the demand is far greater than the supply. A large still for a big plantation costs about £315; but in India stills are locally made costing from £13 6s. 8d. to £16 13s. 4d.

Lemon grass might advantageously be planted as a catch crop to pay the cost of maintaining a young cocoanut or rubber plantation until the trees begin to bear.

NITROGEN-FIXING BACTERIA.

Certain kinds of bacteria once introduced into a soil will exist therein, provided conditions are suitable. They do not contain the nitrogen itself, but make it possible for legumes to obtain nitrogen from the air through the formation of root nodules, and their power to perform this function is dependent on their association with "living" plants of a suitable class.

Usually it may be assumed that soils which contain only a limited amount of organic matter may be improved by the introduction of nodule-forming bacteria.

Nitrogen-fixing bacteria should not be regarded as acting in the light of fertilisers, bringing about increased yields under ordinary conditions.

MANURE FOR LUCERNE.—SPRAY FOR PRICKLY PEAR.

FARMER, Millmerran—

1. Sheep manure is commonly the richest of farm manures. It contains in every ton, 20 lb. nitrogen, 14 lb. potash, 33 lb. lime, 13 lb. phosphoric acid. Sheep urine contains 38 per cent. nitrogen, 44 per cent. potash, 13 per cent. lime, and 1 per cent. phosphoric acid. Lucerne removes from one acre of land in four weeks' time 102 lb. nitrogen, 109 lb. potash, 132 lb. lime, and 18 lb. phosphoric acid. With a good dressing of farmyard manure, sow about 4 cwt. of superphosphate of lime and 2 cwt. of potash per acre.

2. The hydraulic engineer, Treasury Department, would doubtless give you the information you require about boring for water.

3. Exhaustive information is given, in various volumes of this journal on prickly pear destroying. *See* Vols. V., VI., IX., XI., XIII., XIV., XXI., and XXII. In Vol. XXI., p. 256, a good spray is given.

4. All grasses may be sown from May to September.

STORING BEGONIA AND CALADIUM BULBS.

J. W. M., Cambooya—

Make a mixture of $\frac{1}{3}$ part sand, $\frac{1}{3}$ charcoal, and $\frac{1}{3}$ coconut fibre. If the fibre is unobtainable, use $\frac{1}{2}$ sand and $\frac{1}{2}$ charcoal. This must be perfectly dry. Place bulbs and mixture in sound paper bags and tie up. Then store in a warm place. When the bulbs begin to shoot, which should occur about September, put them in small pots and water very sparingly. After the season, as the leaves fade, give less and less water, say, once or twice a fortnight, and, latterly, only once a fortnight, when the bulbs should be ready to put away. Should you not want to remove them from the pots, lay down two narrow battens in any convenient dry, warm place, one higher than the other, and lay the pots on them on their side, mouth downwards. The idea is, to exclude moisture. Leave them in this position till the plants show about a quarter of an inch over the soil. Then repot.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	NOVEMBER. Prices.
Apples (Eating), per case	4s to 6s.
Apples (Cooking), per case	3s. to 5s.
Apricots, per quarter-case	2s. to 4s.
Bananas (Cavendish), per dozen	1d. to $1\frac{1}{2}$d.
Bananas (Sugar), per dozen	2d. to $2\frac{1}{4}$d.
Cherries, per quarter-case	3s. to 7s.
Grapes (Hamburg), per lb.	1d. to $1\frac{1}{4}$d.
Grapes (Sweetwater), per lb.	$\frac{1}{2}$d.
Lemons (Italian), per large case	17s. to 18s.
Lemons (Local), per case	4s. to 6s. 9d.
Mangoes, per case	4s. to 6s.
Nectarines, per quarter-case	3s. to 5s.
Oranges (Italian), per large case	18s. to 20s.
Oranges (local), per case	2s. 6d. to 5s.
Papaw Apples, per quarter-case	1s. to 2s. 6d.
Passion Fruit, per quarter-case	1s. 6d. to 2s.
Peaches, per quarter-case	1s. 6d to 3s. 6d.
Pears, per case	2s. 6d. to 5s.
Pineapples (Ripley Queen), per dozen	...
Pineapples (Rough), per dozen	4d. to 1s. 8d.
Pineapples (Smooth), per dozen	1s. 6d. to 3s. 6d.
Plums, per quarter-case	1s. 6d. to 3s. 6d.
Rock melons, per dozen	1s. to 4s.
Tomatoes, per quarter-case	1s. 6d. to 2s. 3d.
Water melons, per dozen	1s. to 5s.

SOUTHERN FRUIT MARKET.

Article.	Prices.
Apples (Local), per case	3s. 6d. to 6s.
Apples (Nelson's), per case	7s. to 8s.
Apples (Cooking), per case	...
Apricots, per quarter-case	2s. 6d. to 4s.
Bananas (Queensland), per case	10s. to 11s.
Bananas (Queensland), per bunch	1s. 6d. to 4s.
Bananas (Fiji), per case	15s. to 16s.
Bananas (Fiji), per bunch	2s. to 7s.
Cherries, per quarter-case	5s. to 9s.
Cocoanuts, per dozen	1s. 9d. to 2s. 6d.
Gooseberries, per half-bushel case	3s. to 5s.
Grapes (Queensland White), per 12 lb. box	4s. to 5s.
Lemons (Italian), per half-case	12s.
Lemons (Local), per gin case	5s. to 9s.
Nectarines, per half-case	6s. to 7s.
Oranges (Local), per case	9s. to 16s.
Oranges (Italian), per case	14s.
Passion Fruit (Choice), per half-case	9s. to 10s.
Peaches, per half-case	5s. to 8s.
Pears, per packer	4s. to 6s.
Peanuts, per lb.	$5\frac{1}{2}$d.
Pineapples (Queensland), Ripley, per case	5s. to 6s.
Pineapples (Queensland), Common, per case	5s. to 6s.
Pineapples (Queensland), Queen's, Choice, per case	9s. to 10s.
Plums, per gin case	4s. 6d. to 6s.
Tomatoes, per half-case	2s. to 5s.
Water melons (Queensland) large, per dozen	10s. to 12s.
Water melons (Queensland) medium, per dozen	6s. to 8s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JANUARY.

Article.		JANUARY. Prices.
Bacon, Pineapple	lb.	$7\frac{1}{2}$d. to $9\frac{1}{2}$d.
Barley, Malting	bush.	3s. to 3s. 6d.
Bran	ton	£4 5s.
Butter, Factory	cwt.	£4 18s.
Chaff, Mixed	ton	£3 10s. to £4 10s.
Chaff, Oaten	"	£5
Chaff, Lucerne	"	£3 5s.to £4
Chaff, Wheaten	"	£2 to £2 5s.
Cheese	lb.	$5\frac{1}{4}$d. to 1s.
Flour	ton	£10 15s. to £11.
Hay, Oaten	"	£5 15s.
Hay, Lucerne	"	£2 to £3.
Honey	lb.	$2\frac{1}{4}$d.
Maize	bush.	3s. 7d. to 3s. $7\frac{1}{2}$d.
Oats	"	3s. to 3s. 3d.
Pollard	ton	£4 10s.
Potatoes	"	£4 10s. to £8 10s.
Potatoes, Sweet	"	...
Pumpkins	"	£6
Wheat, Milling	bush.	2s. 10d. to 4s. 4d.
Wheat, Chick	"	...
Onions	ton	£6 5s.
Hams	lb.	1s. to 1s. $1\frac{1}{2}$d.
Eggs	doz.	7d. to 1s. $2\frac{1}{2}$d.
Fowls	pair	3s. 6d. to 5s.
Geese	"	6s. to 7s.
Ducks, English	"	4s. to 4s. 3d.
Ducks, Muscovy	"	5s. to 6s.
Turkeys (Hens)	"	...
Turkeys (Gobblers)	"	...

ENOGGERA SALEYARDS.

Animal.	DECEMBER. Prices.
Bullocks	£8 5s. to £9 7s. 6d.
" (single)	£10 2s. 6d.
Cows	£6 to £8 7s. 6d.
Merino Wethers	15s.
Crossbred Wethers	16s.
Merino Ewes	12s. 6d.
Crossbred Ewes	13s.
Lambs	12s. 9d.

Farm and Garden Notes for March.

FIELD.—Take every opportunity of turning up the ground in readiness for sowing and planting winter crops. The main crop of potatoes should at once be planted. As the growth of weeds will now be slackening off, lucerne may be sown on deeply-cultivated soil. The latter should be rich and friable, with a porous sub-soil. The land should be thoroughly pulverised. Do not waste time and money in trying to grow lucerne on land with a stiff, clay sub-soil. Prepare the land a couple of months before sowing, care being taken to cross-plough and harrow before the weeds have gone to seed. This ensures a clean field. Sow either broadcast or in drills. In the former case, 20 lb. of seed will be required; in the latter, 10 lb. A good stand of lucerne has been obtained with less quantities. Lucerne seed is worth from £2 16s. to £3 5s. per cwt. Should weeds make their appearance before the plants have sent down their tap-roots, mow the field. Before they can again make headway enough to do any damage, the lucerne will be strong enough to hold its own against them. Harrow and roll the land after mowing. Gather all ripe corn. It is now too late to sow maize, even 90-day, with any certainty of harvesting a crop of grain. Rye grass, prairie grass, oats, barley (in some districts, wheat), sorghum, vetches, carrots, mangolds, and Swede turnips may be sown. In Northern Queensland, sow tobacco-seed, cow-pea, Carob beans, sweet potatoes, opium poppy, &c. Sow Anatto, Jack fruit, and plant Kola-nut cuttings. Some temperate zone vegetables may be planted—such as egg-plant, potatoes, &c. Coffee-planting may be continued. Harvest Kafir corn and paddy.

FLOWER GARDEN.—Now is the time to plant out bulbs. A complete garden could be furnished with these charming plants, which are to be had in every colour and variety. Amongst the many are—Amaryllis, anemone, arum, babiana, crinum, crocus, freesia, ranunculus, jonquils, iris, ixias, gladiolus, narcissus, Jacobean lilies, tigridia, tritonia.

All bulbs like well-drained, somewhat sandy soil, with a plentiful admixture of leaf mould. Herbaceous plants and annuals which it is intended to raise from seed should be sown this month. Such are—Antirrhinums (snapdragon), asters, cornflowers, dianthus, larkspurs, daisies, cosmia, candytuft, lupins, gaillardias, godetia, mignonette, poppies, pansies, phlox, sweet peas. Cannas now planted will require plenty of food, in the shape of liquid manure. Put in cuttings of carnations. Chrysanthemums require attention in the way of disbudding, staking, watering with liquid manure, &c. Growers for exhibition will thin out to a few buds, and protect the flowers from rain and sun. Dahlias should be looking well. To secure fine blooms, disbudding should be done.

Now, as to climbers which may now be planted. These are—Allamanda Schotii (beautiful yellow), Antigonon leptotus, a charming cerise-coloured climber; Aristolochia elegans, handsome as an orchid, and easily grown; Aristolochia ornithocephala (Dutchman's Pipe), very curious, large, always attracts attention; Asparagus plumosa, grows in any shady place; Beaumontia grandiflora, splendid white flower, grand for a fence, will grow 50 ft. high; Bignonias of several kinds; Bougainvilleas, with their splendid leafy pink and purple flowers, rapidly clothe a fence or unsightly shed with a blaze of blossom; Quisqualis indica, a fine creeper, flowers pink, changing to white; Wistaria, purple and white. Most beautiful is the Bauhinia scandens, rarely seen about Brisbane. We grew a plant of this climber at Nundah, and it soon closed in the front of the veranda for a distance of over 80 ft. The leaves are very small, and in the flowering season it presents almost a solid mass of beautiful round bunches of blossom, something like the hawthorn bloom—pink and white. It seeds

freely, but the seeds are difficult to germinate, and when they have produced a plant it is still more difficult to rear it. A rooted sucker from the main stem will, in all probability, grow.

KITCHEN GARDEN.—During this month a very large variety of vegetable seeds may be sown in readiness for planting out where necessary in the Autumn, which begins on the 20th March. All unoccupied land should be roughly dug, and, where required, add well-decomposed manure. Transplant cabbage, cauliflower, celery, &c. Sow French beans, beet, carrot, turnips, radish, cabbage, cauliflower, cress, peas, mustard, &c. Former sowings should be thinned out and kept clear of weeds. Mulch round melon and cucumber beds with a good dressing of long stable manure, as it assists in keeping the fruit clean and free from damp. Cucumbers, melons, French beans, and tomatoes should be looked for every day and gathered, whether required or not, for if left on the vines to perfect their seeds the plants will soon cease to be productive, or will form inferior, ill-shaped, and hence unsaleable fruit.

Orchard Notes for March.

By ALBERT H. BENSON, M.R.A.C.

THE SOUTHERN COAST DISTRICTS.

The marketing of the main crop of pineapples will continue to occupy the attention of growers; and as it is probable that the plantations have been allowed to get somewhat dirty during the previous month, they should be cleaned up as soon as ever the crop has been got off. The fruit of the new crop of citrus fruit will be showing signs of ripening towards the end of the month; and as the fruit during this period of its growth is very liable to the attack of insect pests of various kinds, it is important that steps should be taken to prevent loss arising from this cause as far as possible.

Large sucking moths of several kinds attack the fruit as soon as it shows signs of ripening; and as they always select the first fruit that shows signs of colouring, it is a good plan to gather a few forward fruit and to ripen them up quickly by placing them on a barn floor, and covering them up with bags or straw. They will turn colour in a few days, and develop the characteristic scent of the ripening fruit. The fruit so treated should be hung up in conspicuous places in the orchard as trap-fruit, as not only will it attract the moths, but also the fruit flies. The moths will be found clustered round the trap fruits in large numbers, and can then be easily caught and destroyed. Fruit fly will also puncture such fruit; and if the fruit is destroyed before the larvæ reaches maturity, a later crop of these insects is prevented from hatching out. Fruit flies may also be caught in large numbers by means of such artificially-ripened fruits. The fruits are smeared with tangle-foot, and hung about the orchard. The fly, attracted by the colour, settles on the fruit, and is caught in a similar manner to house flies on specially-prepared sticky paper. These simple remedies, if carefully carried out, will result in the destruction of large numbers of sucking moths and fruit flies.

The yellow peach moth that does such damage to peaches in Spring, and that attacks corn, sorghum, cotton bolls, custard apples, and many other plants and fruits, often does a lot of damage to citrus fruits. It acts in a very similar manner to the second and later generations of the Codling moth of pomaceous fruits, in that it lays its eggs where two fruits touch, under the shelter of a leaf on the fruit, at the stem end of the fruit, and, in the case of navel oranges, in the navel itself; in fact, anywhere that

there is a likelihood of the egg not being disturbed. The egg hatches out into a small spotted caterpillar, which eats its way into the fruit, causing it to ripen prematurely, and fall off. Where two fruits touch, it often eats into and destroys both, and it frequently leaves one fruit to go and destroy a second. It is a very difficult insect to deal with, owing to the number of fruits and plants on which it lives; but, as far as citrus fruits are concerned, the best remedy is undoubtedly to spray the fruit with a remedy that will destroy the young insect when it starts to eat the skin of the fruit. Bordeaux mixture has been found efficacious, but I am of opinion that spraying with Paris green and lime, Kedzie's mixture, or arsenite of lead will also have good results. The latter poison is, in my opinion, well worth giving a thorough test, as it sticks to the fruit and leaves for a long time. Bordeaux mixture, either alone or in conjunction with Paris green or Kedzie's mixture, is, however, a good remedy, as not only will it destroy the larvæ or prevent the moth from attacking the tree, but it is also the best remedy for black brand or melanose, as well as tending to keep all other fungus pests in check. Fight fruit fly systematically—both by means of the sticky fruit already recommended, and by gathering all fly-infested fruit, such as guavas, late mangoes, kumquats, &c., as well as any oranges or mandarins that may have been infested, as if kept in check now there will be little loss throughout the season. A little fruit will be marketed towards the end of the month. See that it is gathered and sweated for seven days before marketing, and don't gather it too immature. Beauty of Glen Retreat mandarins are often gathered and marketed as soon as they show signs of colouring. They are then as sour as a lemon, and anyone who is unlucky enough to buy them will steer off mandarins for some time to come. This variety should not be gathered till thoroughly ripe, as when marketed in an immature state it spoils the market, as it puts people off eating citrus fruit.

Clean up the orchard after the summer rains, and have everything ready for the marketing of the crop. See that there is a good supply of clean, dry, case timber on hand, as one of the greatest sources of loss in shipment is packing fruit in green cases.

Strawberry-planting can be done throughout the month. Plant such berries as Federation on the lowest ground, and Aurie, Anetta, Trollop's Victoria, Glenfield Beauty on warm, well-drained soils. Prepare the land thoroughly, so that it is in perfect tilth, and in a fit state to retain moisture well; as on this, as much as anything, the success of the crop depends. Where new orchards are to be planted, get the land ready—not the clearing, which should have been done months ago, but the working of the land, as it is advisable to get it thoroughly sweetened before putting the trees in.

THE TROPICAL COAST DISTRICTS.

The Notes for February apply equally to March. See that bananas are netted—keep down weed growth, and market any sound citrus fruits. Clean up the orchards as well as possible, and keep pines clean. Get land ready where new orchards are to be set out, as tree-planting can be done during April and May. Pines and bananas can still be planted, as they will become well established before winter.

THE SOUTHERN AND CENTRAL TABLELANDS.

Finish the gathering of the later varieties of deciduous fruits, as well as grapes. Clean up the orchard, and get ready for winter. Get new land ready for planting; and where there are old, dead, or useless trees to be removed, dig them out, and leave the ground to sweeten, so that when a new tree is planted to replace them the ground will be in good order.

In the drier parts, where citrus trees are grown, keep the land well worked, and water where necessary.

Some Notes on Artesian and Other Water Supplies.

BY LEONARD C. GREEN, F.G.S., M.I.M.E., &c.

In the Western and Central portions of Queensland there are some thousands of square miles of magnificent country, eminently suited to both agricultural and pastoral pursuits; but progress in settling such land has been necessarily slow and spasmodic, the deciding factor being the dearth of surface water.

In good seasons the whole surface becomes a smiling garden, but the unsuitable nature of the rocks to hold water for a prolonged period, owing to soakage, renders settlement in some parts a precarious matter.

The preservation of large supplies by means of dams and tanks is always a somewhat costly undertaking if properly carried out, and in any case is applicable to small areas only. The question of closer settlement, then, is largely wrapped up in water supply, for, however rich the soil or luxuriant the pasture, the herds and general success will always be proportional to the amount and permanency of the precious fluid.

Our western rivers in periods of flood are often raging torrents, but for the greater portion of the year they are merely trickling streams and often nothing but dry sandy beds, with an occasional waterhole.

The larger rivers, however, afford in normal seasons a sufficient supply for stock depasturing on river frontages, but as large areas become resumed and are cut up into smaller areas, the question at once arises, "How are we to water the country back from the river?"

In regard to water, however, Nature has been very bountiful to our State, inasmuch as She has stored up in rocky depths what are practically inexhaustible supplies. This water is termed "Artesian," after Artois in France, where there is a similar occurrence, and the supplies are obtained by boring.

From an inspection of the accompanying map it will be seen that the main drainage system of Queensland is from the eastern ranges to the north-west and the south-west. Speaking broadly, Queensland may be divided into two portions—Firstly, the narrow coastal strip which gradually rises from sea-level towards the west, culminating in a divide usually of high ranges; secondly, the great western interior tableland, which on its eastern margin rises in places to 2,000 feet above sea-level, with a gradual fall towards the Gulf of Carpentaria on the one side and south-west to Cooper's Creek district on the other. The surface of this area is practically an unbroken plain, stretching away to the horizon in broad but shallow waves; hence the name "Rolling Downs" given to this formation by Dr. R. L. Jack.

For the geater part this area is practically treeless, and the monotony of the plain is broken only by an occasional isolated flat-topped hill of Desert Sandstone. It is in the rocks of the plains that artesian water occurs. A large number of bores have been drilled, the majority of which have been successful, but there are many bores unfruitful because of the locality chosen. It is with the idea of assisting by way of explanation in the avoidance of further losses that these few notes are written.

By a glance at the map (Fig. 4) it will be seen that artesian water is found in rocks of two ages:—

1. The Lower Cretaceous or Rolling Downs Formation (green on map);
2. The Ipswich Formation (brown on map).

The rocks of Lower Cretaceous Formation are all of marine origin, as proved by the occurrence of multitudes of fossil shells of marine type, and were formed in an almost land-locked sea. The eastern boundary of this area extends from near Goondiwindi in the south-east, thence past Roma in a north-westerly direction to the east of Hughenden, and across the State to the Gulf of Carpentaria, near Normanton. With the exception of the Cloncurry area, the whole of the western portion of the State is occupied by Lower Cretaceous rocks.

The Ipswich Formation is essentially of freshwater or estuarine origin and the fossil remains chiefly plants. This is at present our chief coal-producing formation in Queensland, and the rocks were so called because the typical features are to be seen at Ipswich. This formation is developed principally in the south-eastern portion of the State, extending as a huge tongue on the surface from the coast to beyond Roma. The Ipswich Formation is partially covered by the Lower Cretaceous rocks, as proved in the Roma bore. The first thousand feet or so penetrated through marine rocks and then entered the coal measures. It was from these latter rocks, in fact, that the gas, which caused such a conflagration, was obtained.

For the occurrence of artesian water there are four necessary conditions:—

1. There must be an underlying impervious stratum (usually old and hardened rocks). Fig. 2 E.
2. A stratum or series of strata (usually Sandstone) through which water can pass freely. Fig. 2 D.
3. An overlying or upper impervious stratum (usually rocks of a clayey type). Fig. 2 C.
4. The continuation of 1, 2, and 3 to some high ground so as to give "head" or pressure.

In Fig. 2, which is an ideal section of an artesian water basin, all of these conditions are present. The rivers rising to the right at "A" flow westward towards "B," and in passing over the strata coloured yellow (porous beds) a large proportion of the water is absorbed. This is termed the "Intake," and the water finds its way gradually towards the centre of the basin. Owing to the impervious nature of the rocks above the yellow porous beds the water in the latter is unable to find its level, and it is obvious that on boring and penetrating these impervious strata the water will rise in the bore under pressure.

The conditions prevailing might be explained by Fig. 3. Here we have a vertical section showing two basins, one inside the other. These represent the underlying and overlying impervious strata. The space between the basins might be filled with sand or other material which allows of the passage of water; this would be the porous layer. All three rise on all sides, thus giving pressure. If, now, the sand layer is saturated with water to the rims of the basins, we have ideal artesian conditions. If the inside basin is pierced near the bottom, the water will filter through and rise in the basin until the level on both sides is coincident. Should the basin be pierced near its rim the water would not reach the inside owing to absence of head or pressure. This, then, would be sub-artesian. Reverting to Fig. 2 it will be seen that the nearer the site of a bore is to the centre of the basin the greater will be the number of flows tapped and the larger the volume of water. At the point "B," three distinct flows would be met with, each producing a greater volume

Fig. 1.

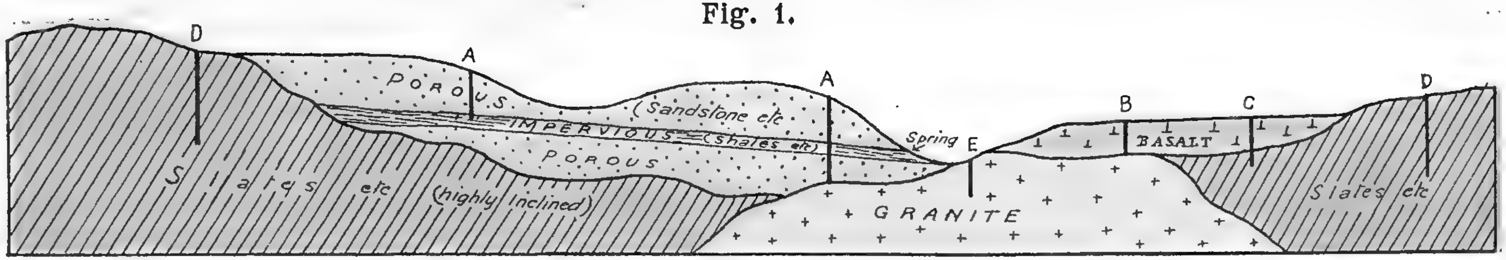
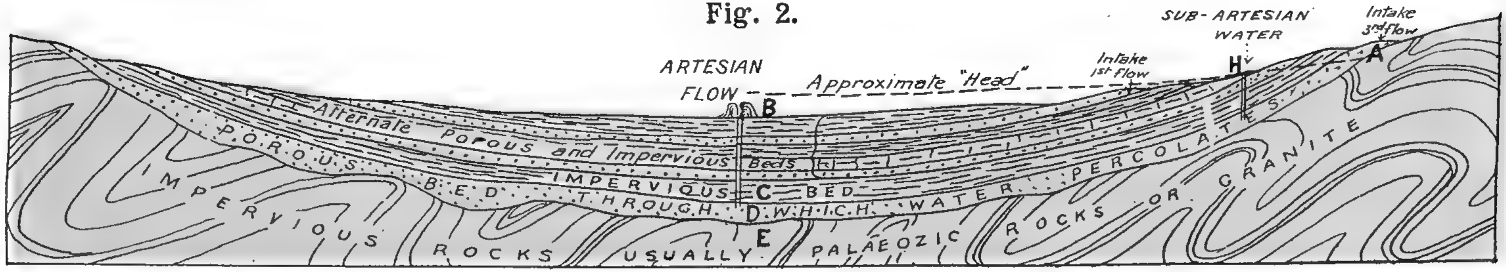


Fig. 2.



Section illustrating the occurrence of Artesian Water in an ideal artesian basin.

Fig. 3.

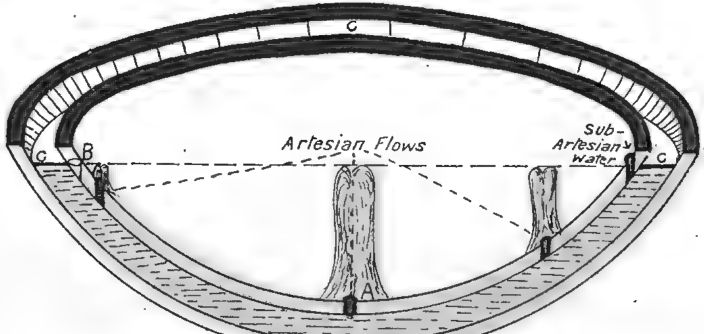
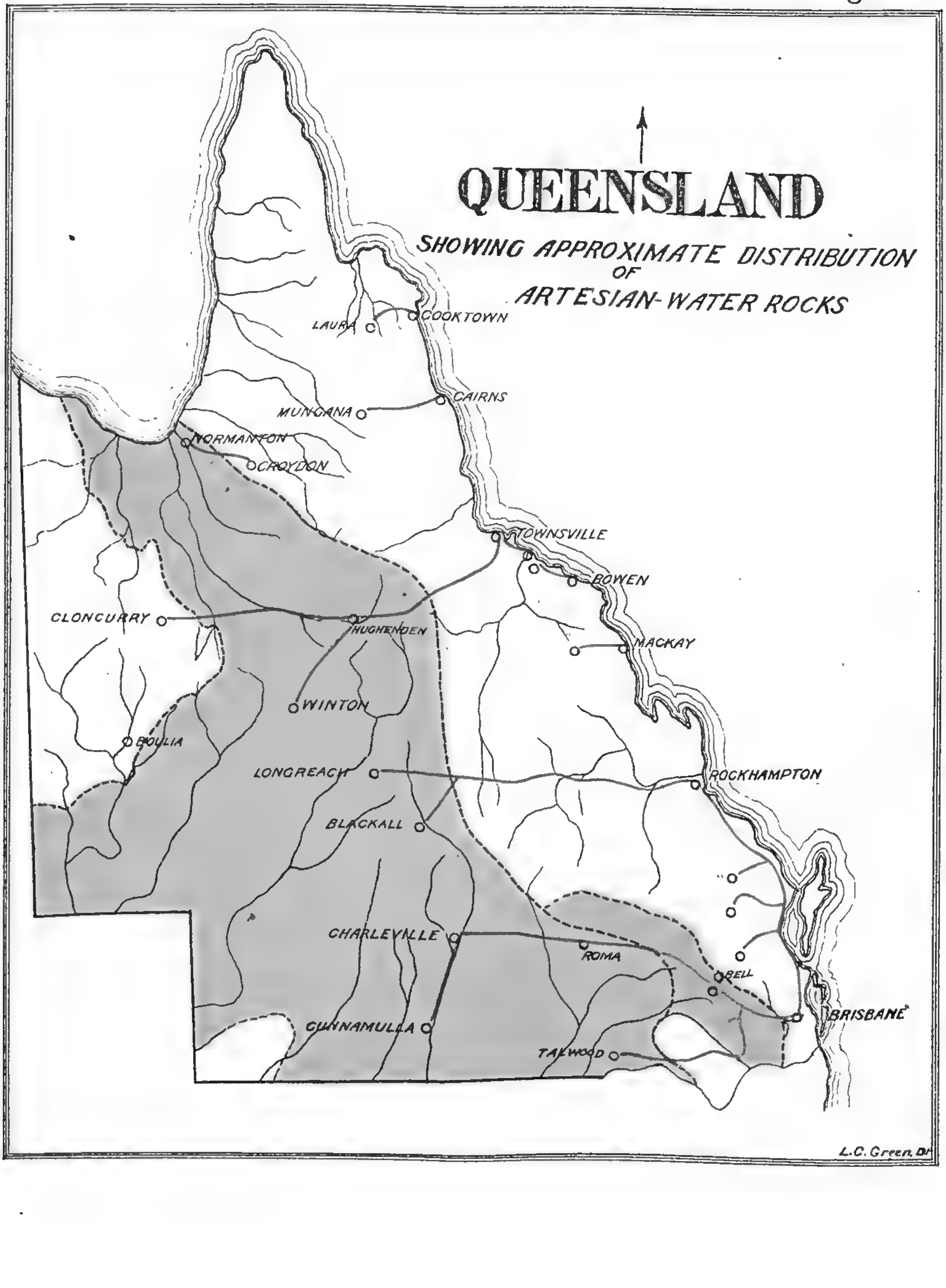


Fig. 4.


QUEENSLAND
SHOWING APPROXIMATE DISTRIBUTION OF ARTESIAN-WATER ROCKS
LAURA
COOKTOWN
CAIRNS
MUNGANA
NORMANTON
CROYDON
TOWNSVILLE
BOWEN
CLONCURRY
HUGHENDEN
MACKAY
WINTON
BOULIA
LONGREACH
ROCKHAMPTON
BLACKALL
CHARLEVILLE
ROMA
BELL
BRISBANE
CUNNAMULLA
TALWOOD
L.C. Green, Dr

as depth increases. Naturally, the water in a bore at "B" would not rise to the level of the water at the intake on account of the resistance offered to the water in passing between the grains of which the sandstone is composed.

At the point "H" the chances of obtaining an artesian flow would be small owing to the elevation of the surface at the bore site. Water undoubtedly would be met with but would not reach the surface owing to insufficient pressure or head. This should be termed a "sub-artesian" supply. The term "sub-artesian" is commonly confounded with water derived from ordinary surface soakage. This is clearly misleading, as there is a great difference between the two types. In the first place the source of the water in sub-artesian cases may be a hundred or more miles distant, whereas in the case of surface wells and pump wells the water is purely of local or semi-local origin and has accumulated from waters percolating from the surface. Again, in sub-artesian water it is a common occurrence to strike several supplies at various depths, each succeeding supply being under greater pressure. Well water is invariable in pressure in normal seasons, and the supply is more readily affected by periods of drought than any other type.

Water obtained from springs and shallow wells may owe its origin to several causes or physical conditions of the underlying rocks, the commonest of which are here detailed.

Well water is surface water, and has its origin chiefly in the percolation of rain water from the surface downwards or vertically, as distinct from artesian wells, which are fed laterally. Water falling on a porous rock such as sandstone (Fig. 1 A—yellow) would find its way downwards until some impervious rock such as a shale (Fig. 1—blue) is met with. There would then be a tendency to travel along the surface of the impervious stratum if the latter were inclined, and should this impervious layer become exposed in a valley the water would issue as a spring (Fig. 1 E). Should there be no outlet at the surface, the result would be that the sandstone would become saturated and water could be obtained by digging shallow wells.

The junction lines between two different types of rock are frequently fruitful of water, affording a plane of weakness along which water can readily pass. It must not be imagined, however, that only rocks of a porous nature are capable of yielding supplies of well water, for the natural jointing, cleavage, and faulting (breaking) of rock masses afford passage to and retention of surface waters. A well sunk under these conditions, however, is rarely as prolific in supply as is the case of the sandstone previously mentioned.

In Fig. 1, I have endeavoured to illustrate the occurrence of well water under varying conditions of both form and rocks. The letters used indicate in order the varying chances of success likely to be met with. At "A," for instance, the chances for a good supply are usually excellent; at "B," good chances exist, but inferior to those at "A," and so on to "E," where the results would be disappointing.

An important consideration in the sinking of a well is its position from the hygienic point of view. The pollution of well water from sewage is a grave danger, and too much attention cannot be paid to this point, especially where wells are adopted as a means of domestic supply in townships.

No one can ever say with absolute certainty what the results of boring or well-sinking will be, but a study of the structure of the rocks before embarking on an enterprise of well or bore sinking reduces the chances of loss to a minimum, and it behoves those whose calling necessitates such undertakings to thoroughly examine the country before deciding on a venture which might cost hundreds or perhaps thousands of pounds.

Agriculture.

CONSERVATION OF FODDER; ITS DIFFICULTIES AND HOW TO OVERCOME THEM.

By D. MACPHERSON, Manager, Biggenden State Farm.

Looking over the country now, one cannot but be struck by the beautiful green appearance it presents, and the number of stock that are depastured on it. Everything looks well and all our hearts rejoice; yet, though we have had five years of good seasons, one looks in vain for stacks or silos, or any extensive method of conserving fodder.

Now, even during these five years of plenty, we have had short, and severe snaps of dry, hard weather, and many have been hard put to it to see their cattle through; but still no provision is made, or at most no more than will see the stock over an ordinary hard winter.

The excuses for this state of affairs are manifold, but the greatest one is "the almighty dollar."

Where cultivation is done, the inclination is to grow something that will bring in ready cash, rather than to grow a crop to store, which may not be needed for two or three years. To persons who take this view there is little to say, except that after the first really bad time they will probably find themselves worse off than they are at present.

Others have the will, and recognise the necessity of making some provision; but as they pin their faith to hay, where climatic conditions are so often against this crop, they get little further forward, for a dry winter generally means a poor crop to harvest, while spring storms often make the harvesting of the winter-grown hay crop very uncertain. Summer-grown hay crops, while they can generally depend upon getting enough rain to make them grow, are often thoroughly ruined by continuous rain at harvest time, and, after losing the result of his labour several times, the farmer is apt to say, that the little hay he grows and saves costs more than it is worth. Ensilage, however, is not so subject to these adverse conditions; and now, that so much is known and written about this valuable class of fodder, it is surprising that more silos are not to be seen either full or filling.

The best silage crops grow in the summer, when it may be expected that they will get sufficient rain for their requirements; while the time of harvesting can be arranged so, that the summer rains are likely to be over before the crop ripens; but, if not, so long as the drays can work, it is not too wet for silage making. A good crop, safely saved, is in silage making more of a certainty than most matters connected with agriculture.

Why then do we not see silos, or stacks of silage, or pits full of this useful stand-by?

Perhaps, because stacks require skill to build, and a greater bulk of stuff than the average dairyman is prepared to handle, if the percentage of loss is to be kept anywhere within reasonable bounds.

Pit silos should be used more, but the expense of excavation, with the possibility that cement may after all have to be used, coupled with a want of experience as to the working, probably deter farmers from giving this class of silo the consideration it deserves.

Overhead silos, however, are now proved, and should be going up in dairying districts by the score; but, in this district, there is, so far as I know, only the one at the State Farm. The trouble seems to be the cost, not so much the cost of the tub which nearly every one will admit is money well spent, but the purchase of a good plant for filling. This will run to close on to £200,

and on an ordinary dairy farm would be idle eleven months out of the twelve, while if primitive methods of filling are adopted, the length of time occupied by that operation is likely to be more than the average dairy farmer can spare.

It would, therefore, seem that in ensilage making lies the only hope of getting together a reserve of fodder in districts where climatic conditions are frequently against hay making on any extensive scale. But, if we have to wait till each individual builds a silo and buys a plant for filling, the next drought, and possibly the one after it, will be upon us before sufficient silage is conserved to feed even a tenth of the stock now being pastured. Consequently, not only will cream and pig cheques reach vanishing point, but many will, at the end of even one year's drought, find themselves very far short of the number of stock they had when it started. I have endeavoured to show the advisability, particularly under certain climatic conditions, of curing ensilage in preference to hay, and have put down as far as possible the most valid reasons I have heard advanced against ensilage, which latter, being boiled down, mostly amount to "We cannot afford it." Well, when a man is making absolutely no more than will keep body and soul together, it is useless to talk to him about making provision even for his own flesh and blood let alone for his cattle. But there are not many of our dairymen now who could not raise enough to put up a silo tub, and I believe many would if they could see any way of filling it cheaply.

Surely this detail should not stand in the way of progressive men. We have co-operative dairy companies, then why not co-operative silo companies?

If a number clubbed together, a plant could be got without anyone feeling the pinch very greatly. A little management would enable one plant to cut for quite a number of silos, and the engine, the most expensive part of the plant, need not be idle during the off-season, as corn-shelling, &c., could be done, not only for shareholders but for outsiders. Failing this, if some enterprising person would put up silos for himself, install a plant for his own filling requirements, and let it be known that he was prepared to fill silos for others at a given price per ton, I feel sure the number of silos in that neighbourhood would increase wonderfully, and the dreaded word, drought, would at least lose some of its terrors.

REPORT ON EXPERIMENTS WITH WINTER CEREALS, CARRIED OUT AT THE STATE FARM, BUNGEWORGORAI, ROMA, DURING 1909.

WINTER CEREALS, 1909.

METEOROLOGICAL.

The weather conditions during the first part of the season were all that could be desired, sufficient rain falling during April to thoroughly soak the soil. During May, the precipitation was limited, but sufficient was experienced to promote an even germination. June, July, and August were exceptionally wet, and these conditions in conjunction with the rather mild weather, brought about an excess of growth, with the result that many of the quickly-maturing varieties had to be mown, in order to check growth, in the month of July. September and early part of October were dry, as during six weeks only ·12 of rain was registered, this resulted in slight pinching of grain on poorly worked areas and medium late sown crops, but the benefits accruing from the dry spell, much more than counterbalanced these slight effects, as it proved uncongenial to the development of rust, which made its appearance in a virulent form. The absence of rain at this period also resulted in the harvest being fully a fortnight earlier than that of 1908.

The rainfall experienced from 1st April to 30th October was 11·23.

SERIES A.

Preparation of Seed Bed.

In order to secure the desired condition for the reception of seed after the removal of silage crops in January, it was necessary to plough twice, double disc once, and harrow five times. The variety of wheat with which the experiments were tested was Bunge No. 1. Seed was drilled in and harrowed.

The following are the experiments under observation, and results obtained from acre sown second week May; harvested fourth week October:—

Block No. 1.—Ploughed 4 in. deep. Harrowed and rolled once during growth. Yield, 18·9 bushels to acre.

Block No. 2.—Ploughed 4 in. deep. Harrowed once during growth. Yield, 19·5 bushels to acre.

Block No. 6.—Ploughed 4 in. deep Harrowed twice during growth. Yield, 16·2.

Block No. 4.—Ploughed 4 in. deep. Harrowed thrice during growth. Yield, 17·1.

Block No. 5.—Ploughed 6 in. deep, 1 in. deeper than last season. Yield, 20·6 bushels.

Block No. 6.—Ploughed 5 in. deep, no after cultivation. Yield, 20·9 bushels to acre.

Block No. 7.—Ploughed 6 in. deep, no after cultivation. Yield, 21·7 bushels.

Block No. 8.—Ploughed 6 in. deep. Rolled and harrowed once during growth. Yield, 23·6 bushels.

Block No. 9.—Ploughed 6 in. deep. Harrowed once during growth. Yield, 24·8 bushels.

Block No. 10.—Ploughed 6 in. deep. Sown at rate of 40 lb. seed to acre. Yield, 24·9 bushels.

Block No. 11.—Ploughed 6 in. deep. Sown at rate of about 18 lb. to acre. Yield, 20·2 bushels.

Block No. 12.—Ploughed 6 in. deep. Harrowed twice during growth. Yield, 24·5 bushels.

Block No. 13.—Ploughed 6 in. deep. Drilled in 4 in. (approximately) deep. Yield, 24·1 bushels.

Block No. 14.—Ploughed 6 in. deep. Drilled in 3½ in. Yield, 23·2 bushels.

Block No. 15.—Ploughed 7 in. deep (approx.). Yield, 23·8 bushels.

Block No. 16.—Ploughed 8 in. deep. Rotation crop of panicum every second year. Yield, 24·2 bushels.

Block No. 17.—Ploughed 8 in. deep. Cropped with pumpkins every second year. Yield, 25·6 bushels.

Block No. 18.—Ploughed 8 in. deep. Cropped with rape every second year. Yield, 23·3 bushels.

Block No. 19.—Ploughed 8 in. deep. Cropped with cowpea every second year. Yield, 23·5 bushels.

Block No. 20.—Ploughed 8 in. deep. Bare fallow every second year on each half of plot. Yield, 22 bushels.

SERIES B.

Scientific soil culture (Prof. Campbell's method).

Paddock B, blocks 1 and 3.—The seed bed received the following treatment in complying with the regulations laid down by the originator of the

system—viz., four ploughings, three double discings, and twelve harrowings. The various wheats sown and results were as follows:—

Federation.—Area, 4 acres. Sown, 29th April. Harvested, 4th November. Yield, 2·4 bushels to acre. Failure due to rust, though previous to being affected by the fungoid, the crop looked beautiful, and gave promise of returning a very heavy yield.

J. Brown.—Area, 5 acres. Sown, 20th April. Harvested, 29th October. Yield, 23·4 bushels to acre. This was a most handsome crop, in some places reaching a height of 6 ft. In conjunction with the earlier maturing varieties, this is one, if not the most, suitable kind to go in for, as it can be sown earlier and matures about a fortnight later. Besides this it is a splendid wheat for hay, stock being very fond of it. It shows many desirable qualities in the grain field—viz., holds its grain well, good strong straw, which enables it to stand up against the wind, is a fair rust resister, and apparently does well on second-class soils.

SERIES C.

Area of blocks, one-quarter acre.

The varieties grown comprise fourteen wheats imported direct from England, one from America, and nineteen grown here in the previous season, whose behaviour warranted this area being devoted to their propagation. English wheats, sown for the first time this season, were procured from Messrs. King and Sons, Essex, England, and arrived here the second week in April, and, as instructed, were sown as soon as possible. Owing to faulty seed, the germination was very poor, and one variety failed altogether. Seeds were sown under very favourable conditions in the third week in April, being the first put in. Growth made, very slow, and at the end of five months, when some of our later sown earlier maturing varieties were in ear, these wheats had not covered the ground, being only 3 in. in height and of very poor promise. It was not until the middle of October that any sign of reproduction was manifested by them, and as dry hot weather prevailed and rust was present among them, it was not anticipated that sufficient grain would be matured to provide seed for a further sowing, but the tenacity of the wheat plant again manifested itself, and in some instances fair yields of fair grain were obtained. In further testing these varieties next year, it is intended to sow them at least a month earlier.

Sown third week April. Harvested second and third week December, with the results as follows:—

Ceres.—Yield, 7·2 bushels to acre. White wheat.

Dattell.—Yield, 12·2 bushels to acre. White wheat.

Emperor White.—Yield, 5·6 bushels to acre. Red wheat, badly infested with rust.

Essex Conqueror.—Yield, nil. Failed to germinate.

Improved Square Head.—Yield, 10·8 bushels to acre. Red wheat.

Jubilee Champion.—Yield, 5·4. White wheat, badly affected by rust.

Red Cross.—Yield, 10 bushels. Red wheat.

Rent Payer.—Yield, 3·5 bushels to acre. White wheat (very poor).

Rivett's Red (bearded).—Yield, 7·1. Red wheat (inclined to fall down).

Square Head Master.—Yield, 7·0 bushels to acre. Red wheat.

Stand Up.—Yield, 3·2 bushels to acre.

White Champion.—Yield, 3·1 bushels to acre.

Straw in all cases was exceedingly short, due no doubt in a great measure to change in climatical conditions and unfavourable weather experienced in later stages of growth. The following two English varieties were tested here

last season with poor results, and have been further tried this, the yield being as follows:—

Garton's New Era (imp. 1908).—Bearded. Yield, 9·4. This wheat though sown a week earlier than last year did not do as well, the dry spring evidently proving unfavourable. The coarse awns of this variety prove very troublesome when cleaning grain.

Garton's Red King (imp. 1908).—Yield, 8·8. The yield is more than double that obtained last year, due to the fact that an even germination resulted from sowing our own seed, that received from England in 1908 being very weevily, causing very low percentage to germinate. All the English wheats are much softer in the grain than most of our varieties, and in consequence of this are more susceptible to weevil, in fact weevils (reddish brown) were met with when harvesting.

American wheat (*Triticum dicoccum*).—Sown, April, third week. Harvested, 11th November. Yield, 13 bushels per acre. This wheat, which is a native of Switzerland, has come greatly into favour for hay making purposes in America, from whence the seed sown here this season was obtained. Though not utilised for this purpose the observations made fully bear out the statement, the only characteristic so far appreciable which might be said to be detrimental is the bearded head, though possibly a good deal of this might be removed through being broken off in the making.

The following varieties of those obtained from Roseworthy Agricultural College last season produced a yield which warranted their inclusion in this series. They were sown in third week of April, and harvested first week in November:—

Variety.	Yield per Acre. Bushels.	Remarks.
College Purple Straw ...	15·5	Grain pinched; rusty
Hudson Early Purple Straw...	13·8	Grain pinched; very rusty
Jumbuck	17·2	Grain fair; slight rust
Leak's Rust Resisting ...	Nil	Cut for topping stack; very rusty
Manitoba	Nil	Cut for topping stack; very rusty
Marshall's No. 3	Nil	Cut for topping stack; very rusty
Silver King	13·2	Grain pinched; slightly rusty
Steinwedel Imp.	8·8	Grain very pinched, on a par with L.R.R. Manitoba
Wallace	9·6	Grain very pinched, on a par with L.R.R. Manitoba
99 C 23 A 2...	10·5	Grain pinched; poor, rusty
J.C. 157	23·4	Grain good; medium straw in length and stoutness. This wheat is well worthy of further trial.

The following were sown here for the fourth time this season. Ground seeded, April, third week. Harvested, first week November:—

Variety.	Yield per Acre. Bushels.	Remarks.
Crossbred No. 33	21·4	Slightly rusty grain; pinched; straw, medium long, slender
Crossbred No. 348	6·6	Short straw; very rusty; grain very pinched
Crossbred No. 349	21·3	Medium long straw; fine; slightly rusty flag; grain fair
Crossbred No. 353	25·6	Medium long stout straw, fairly free of rust; grain good; medium early
Rymer	16·2	Medium late; stout straw; fairly free from rust; situation decreased yield. Once during period of growth water lodged on crop for two weeks.

SERIES D.

Comprised in this series are those varieties whose yields last season were above the average, and those which had a good average for the seasons they had been grown here. The preparation of soil for reception of seed necessitated the following operations being carried out—viz., two ploughings, one double discing, and three harrowings, the seed drill was followed immediately by harrows, and the crop was twice cultivated during growth with the same implement. The results, &c., of varieties grown were as follows:—

Alpha.—Sown, 3rd May, 1909. Complete failure. The seed of this variety came originally from West Australia, and was sown for the first time last season with splendid results. This season it was easily the worst crop on the farm, and afforded a most striking illustration of the direful effects of rust on a susceptible variety, being wholly destroyed, and within a fortnight after infestation the block had the appearance of having been battered down by a hailstorm.

Bunyip.—Sown, 3rd May, 1909. Harvested, 19th October. Yield, 12·2. Grain pinched. This variety as usual was the first to ripen. It was badly infested with rust in places, but its earliness resulted in grain being formed, while the shortness of its straw prevented it from tumbling down. Though this variety has been fairly consistent to date, it is not one that could be recommended to any person to grow, as the feature which stands it in good stead—viz., its earliness, leads to its destruction when late frosts are experienced in low-lying localities.

Nhill.—Sown, 4th May, 1909. Harvested, 1st November. Yield, 5·8 bushels to the acre. Grain pinched. Last year a yield of 37·6 bushels to the acre was obtained from this variety, and when earing this year the crop looked quite as heavy. It became badly infested with rust in the latter part of September, which practically destroyed it.

Pratt's Comeback.—Sown, May, 1st week. Harvested, 1st November. Yield, 11·3 bushels to acre. This variety more suited to cooler climate. Though not infested with rust to any great extent, what there was, in conjunction with its inability to withstand hot, dry weather, influenced the quality of grain and yield considerably, as the grain dried out. This drying out instead of ripening off, was noticed in connection with this wheat in 1907.

West Australian Crossbred.—Sown, 1st week, May. Harvested, 19th October. Yield, 5·4. This wheat last season yielded 32·2 bushels to the acre. Poor yield due to rust. Grain frightfully shrivelled.

Yandilla King.—Sown, May, 1st week. Harvested, 8th November. Yield, 20·5 bushels to acre. Grain plump, bright, and of good appearance. Straw medium length and stoutness, and clean. The two seasons grown it has averaged 22·9 bushels to the acre, is easy to strip, and stands up well. Practically no rust was noticeable in crop.

Durum Wheats.

Cretan.—Sown, 6th May. Harvested, 8th November. Yield, 17·3 bushels to acre. Grain good, probably the best sample obtained from this variety here. No sign of rust. Strips well and threshes well, but is rather a difficult crop to winnow. Straw fine, strong, nearly solid.

Velvet Don.—Sown, 6th May. Harvested, 8th November. Yield, 17·9 bushels to acre. Rust present. This is a much more difficult crop to harvest than Cretan, the awns being much coarser and straw stouter.

MISCELLANEOUS BLOCKS AND VARIETIES.

Kubanka—Durum wheat (bearded).—Area, 5 acres. Sown, May, 1st week. Harvested, 10th and 11th November. Yield, 16 bushels to acre. Grain good. The wet winter was evidently suitable for the proper development of this crop, as in many places it was over 6 ft. in height, the yield in such places being very heavy, but as a goodly portion of the area devoted to it had the surface soil washed off in February, 1908, the crop was uneven, hence the medium yield.

Bobs.—Sown, 5th May. Cut for hay. This plot previous to being mown became infested with rust, though not sufficient to interfere with its value for this purpose. It was the most handsome crop on the farm this season, being 6 ft. high and very thick, and if it had been allowed to remain for grain a fair quantity of middling quality would have resulted. This is one of the varieties of wheats which at certain stages can become badly infested with rust and still produce fair grain.

Sussex.—Sown, 2nd week, May. Harvested, 8th November. Yield, 24 bushels to acre. Medium late, slightly rusty. Grain good, good head. Has proved a fairly consistent yielder.

The following varieties were sown 4th week, May, on poor sandy soil:—

Bobs.—Harvested, 22nd November. Yield, 6·9. Area, 1·3 acres.

Bunge.—Area, 8 acres. Harvested, 12th November. Yield, 7·2 bushels to acre.

Federation.—Area, 0·8 acres Harvested, 12th November. Yield, 6·8 bushels to acre.

Gluyas.—8 acres. Harvested, 12th November. Yield, 6·4 bushels to acre.

The application of fertilisers on such areas would undoubtedly prove beneficial, but owing to porosity of soil it would probably have to be applied during growth of plant and not put in when seeding. All these blocks were attacked by rust. It will be noticed that Bunge No. 1 gave a slightly better return than the others.

Samples.

An area of about $\frac{1}{100}$ of an acre was devoted to each of the following varieties, their behaviour not warranting a larger area being cropped with them.

Lot 1.—Seed obtained from Roseworthy Agricultural College, in 1908. Sown, 26th May. Harvested, December, 1st week.

Variety.	Yield per Acre in Bushels.	Remarks.
Bobs	6·6	Rusty; grain fair.
Comeback C	10·0	Long straw (lodged); grain fair. Sheds grain; medium early
Cumberland	6·6	Rusty; poor; very pinched
Federation	10·0	Rusty; late; short straw; flaggy
Jumbuck	5·0	Very late; flaggy; rusty
Red Fife	6·6	Very late; good stooler; unsuitable
Stanley D	5·0	Late; grain pinched; straw very short
Warden Hay Wheat ...	14·5	Late; fairly free rust; grain good; short straw
White Essex C	6·5	Late; grain fair; head poorly filled
White Fife D	6·2	Late; grain pinched
K3 91	8·7	Late; grain fair; head poorly filled.

Lot 2.—From seed sown for the first time here, some of varieties being new. Sown, 26th May. Harvested, December, 1st week.

Variety.	Yield Rate per Acre in Bushels.	Remarks.
Comeback	Nil	Blown down flat. Grain could not be garnered
Dexter	Nil	Blown down flat. Grain could not be garnered
Florence	3·0	Fairly early and clean; a good deal of grain lost through being down
Genoa	3·0	Very late; grain poor; short straw; red wheat
Kubanka	5·0	Made poor growth; late
Kubanka	3·3	Made poor growth; late.
Mudgee	7·5	Fairly late; long straw (stout) flaggy; good stooler
Saragolla	5·0	Durum wheat; late and poor
Thew	10·0	Fairly early; good stooler; long fine straw
Uppercut	5·0	Medium short stout straw; flaggy; free of rust; medium late
Warren	8·0	Medium short stout straw; flaggy; free of rust; medium late
White Loaf	8·0	Medium short fine straw; flaggy and rusty
Bunyip	10·0	Very early; rusty; grain fair; short straw
Cleveland	8·0	Late; medium long straw; fair grain
Cretan	10·0	Macaroni, one of the best of its class; free rust; fine strong straw; bearded
Amby	8·3	Rather long straw; small head; good stooler; grain fair
J. Brown	10·0	Late; rusty; grain pinched
Rymer	10·0	Late; flaggy; grain fair; slightly rusty.
Tarragon	5·0	Very late; flaggy; wholly unsuitable.

Lot 3.—Comprises the varieties grown here for some considerable time and which were of poor promise last season.

Variety.	Yield Rate per Acre in Bushels.	Remarks.
Arnantka	8·3	Durum var. bearded, fairly free of rust; medium long straw
Baltic Red	7·5	Very late; flaggy and rusty; an undesirable variety here
Bald Medeah	5·0	Thin crop; straw coarse and tall; Durum var. beardless; free rust
Belatourka	10·0	Medium late; medium long fine straw; clean; Durum wheat; bearded; grain fair
Black Don	6·1	Medium late; medium long stout straw; fairly clean. Hardly worth continuing with.
Budd's Early	9·1	Late; grain fair; not suitable for this district
Comeback	12·5	Medium late; good deal down; grain good; fairly free from rust

Variety.	Yield per Acre in Bushels.	Remarks.
Jonathan	7·5	Very late and poor, unsuitable
La Huguenot	8·3	Similar to "Bald Medeah"
Lofthouse	2·5	Very late; wretched; totally unsuitable
Minnesota B5	3·3	Very late; wretched; totally unsuitable
Morocco	10·4	Durum wheat; short stout straw; fairly clean; grain very large
Odessa	4·1	Very late, wholly unsuitable
Power's Fife	4·1	Very late, wholly unsuitable
Russian Ulka	4·5	Very late, wholly unsuitable
Schneider	10·0	Late; grain fair; rusty; straw medium short
Select Fife	2·9	Very late; wholly unsuited to the district
Turkey	11·2	Late; grain fair; straw medium long; flaggy; Durum var.
Usher's R.R.	2·9	Late; grain very pinched; straw short; rusty; bearded variety
Yellow Gharnovka	2·9	Late; grain pinched; unsuitable var.; bearded.

Lot 4.—Sown, 27th May. Harvested, 1st week, December. All these varieties are crossbreds received originally from Hermitage State Farm.

Variety.	Yield per Acre in Bushels.	Remarks.
No. 12	10·0	Early; grain fair; straw medium long; clean
No. 25	11·6	Badly down; grain fair; medium early
No. 50	11·6	Badly down; more than half ungarnered; grain fair; medium early
No. 53	5·4	Down; grain fair; medium early
No. 91	10·8	Early; grain fair; stood up fairly; straw clean; good strip.
No. 121	14·0	Early; erect; good straw; grain fair; uneven
No. 181	11·6	Medium early; pinched grain; weak straw; flaggy
No. 343	15·8	Down; grain fair; straw clean.

Lot 5.— Seed introduced from New Zealand this season. Sown, 17th June. Harvested, December, 1st week. These samples were obtained too late to receive a fair trial.

Variety.	Yield per Acre in Bushels.	Remarks.
Comeback	9·1	Late; short straw owing to lateness, sowing; grain pinched; fairly clean
Federation	8·3	Rusty; grain pinched
W. S. Tuscan	3·3	Very late; grain pinched.
W. S. Tuscan	7·5	Very late; grain fair
Yandilla King	7·5	Late; grain fair
Yandilla King	2·9	Late; grain poor. This grain very dissimilar to Y.K. grown here.

Lot 6.—In this are included hybridised grains of 1908, the seed resulting from hybrids raised in 1908, grain of selected plants secured at different times, and a few special samples received from outside sources this year.

Selected Bunge No. 1.—Grain first selected in 1907. This season's sowing resulted in 3 lb. of seed being obtained. Owing to grain being somewhat similar to Manitoba, it is hoped that it may prove a stronger wheat than the original Bunge. Should such be the case, it will be a decided improvement, as all its other characteristics are similar. (Sample forwarded.)

Selected W. A. Crossbred.—Failure.

Selected Manitoba.—Two stools resulted; grain fair.

Egyptian Mummy.—A few stools resulted, but the variety is hardly worth troubling over.

Champion Wheat of the World.—Seed received from Canada. Sown, 3rd week, May. Harvested, December, 1st week. Yield at rate of 1·6 bushels to acre. Appear to be of the same type as Manitobas, which mature too late in the summer here to be of much value.

Ward's Prolific (Sutton).—Sown, 3rd week, May. Harvested, December, 1st week. Yield at rate 10·0 bushels to acre. Straw stout, flaggy, head long, glumes close, grain long.

Ward's Prolific (Bathurst).—Sown, 3rd week, May. Harvested December, 1st week. Yield at rate 6·6 bushels to acre. Straw stout flaggy, head long, glumes compact, grain long. The wheat growing in the Maranoa as this variety is "Spring Wheat" in most instances.

Crosses, 1907.—Only two plants of the five which survived the depredations of the grasshoppers exhibited characteristics different to either parent, and he grain obtained from these was duly sown. Their breeding was Poland and Western Spring Wheat, former male parent. The variations amongst resulting plants were astounding.

Crosses, 1908.—Crossbred No. 50 (female) X Durham, Bobs, Alpha (male), Durum blood, distinguishable this season; 38 stools.

Bunge (male) X Bunyip (female); 49 stools. Variations distinguishable.

Alpha (male) X Bunge (female); 19 stools. Variations slight.

W. Spring (male) X Comeback; 17 stools. Variations slight.

Durum (male) X Bunge No. 1; 42 stools. Variations pronounced.

Bunge (male) X Durum; 26 stools. Variations pronounced.

Bunge (male) X 07 X; 25 stools. Variations: Cannot state.

07 X (male) X Bunge; 38 stools. Variations: Cannot state.

Federation (male) X Bunge; 140 stools. Variations: Many present.

Bunge (male) X Federation; 29 stools. Variations: Many present.

Bobs (male) X Bunyip; 16 stools. Variations not distinct.

Bunyip (male) X Bobs; 36 stools. Variations not distinct.

Bobs (male) X X 91; 12 stools. Variations not distinct.

Durum (male) X 343; 14 stools. Variations apparent.

Bunyip (male) X Durum; 2 stools. Variations apparent.

A germination of about 90 per cent. was obtained.

HYBRIDISING.

It is to be regretted that circumstances prevented further work in this direction being accomplished this year, but that carried out last season will require a great deal of time to follow it up properly. When doing this branch of work in 1908, an endeavour was made, as far as possible, to adopt the ideas put forward in the pamphlet received on "Mendel's" theory.

FUNGOID DISEASES.

Rust was present throughout the crops during the whole of the winter, which was mild and wet. With the advent of warm weather it spread with amazing rapidity, and by the middle of September many of the most susceptible varieties were destroyed, more especially was this the case with those growing on areas having poor natural drainage. The dry spell experienced minimised to a great extent the ill effects, but in crops which were rank and straw soft the benefits derived from this were not as great as where the crops were thin and growth not so luxuriant.

One of the first crops to show rust on the flag was Bunge No. 1, which (flag) became so badly infested as to die right off, though straw remained uninjured and grain only in one or two instances showing a slight effect. Other varieties adjacent infested later—viz., Alpha and Federation—were to all intents and purposes completely destroyed, plainly demonstrating that the first-named can lay claim to being rust-resisting in all senses of the word.

Smut.—This fungoid was conspicuous by its absence.

SUMMARY OF RESULTS OF OBSERVATIONS FOR 1909.

The Fife wheats have again demonstrated this season that they are not suitable varieties for growing here. The Durum wheats, on the whole, gave a more favourable return this year, and, in some instances, made exceptionally heavy growth, but are not to be compared with the best of our own bread wheats as regards yield, and take twice as long to harvest, which is a most undesirable quality when it is garnered in the manner it is here.

Best Time for Sowing.—May has again proved to be with most varieties the best month to sow in, though some require putting in much earlier in order to avoid, as far as possible, the premature ripening off due to hot weather, and, again, in frostly localities some early varieties are better sown a little later.

Seeding.—Half a bushel to the acre is the usual rate of seeding here excepting where otherwise mentioned, and for ordinary sowing is sufficient, though half the quantity has produced the same yield. Thin seeding in most cases is not to be recommended, as the crop is more liable to injury by wind storms through straw being longer and head much heavier and less support being afforded by one plant to the other, owing to distance between. These faults could be obviated, to a great extent, by sowing some of the short-strawed variety, but our most suitable wheats do not come under this category. There is another feature of thin seeding which affects either long or short strawed crops, and that is its propensity to weediness, which not only results in crop being deprived of a good deal of moisture, but, in the event of a wet spring, interferes with harvesting, and in some instances prevents grain from being harvested at all. An area sown here at rate of 40 lb. to the acre produced a nice yield of even quality grain. The crop itself was shorter and finer in the straw, much less flag, very even, and ripened a few days earlier and more evenly than adjacent ones, sown at ½-bushel.

As grading (which is practically a wholesale selecting of plants most suited for the conditions under which they were grown) has been proved to be one of the leading factors in improving the standard of wheat crops, all seed was so treated previous to being sown here this season.

SUMMARY.

The following tabulated list of the yields, totals, and averages of the experiments carried out and varieties grown since the inception of this farm furnishes some very interesting comparisons.

Results obtained from different methods of tillage, rotation, cropping, &c., laid down in 1907, this year's returns coming under Series A in report, and included in following:—

Block.	Yield, 1907	Yield, 1908.	Yield, 1909.	Total.	Average.
					Bushels to the Acre.
No. 1	12·8	13·4	18 9	45·1	15·03
2	12·6	14·2	19·5	46·3	15·43
3	10·8	14·1	16·2	41·1	13·70
4	11·7	17·6	17·1	46·4	15·46
5	11·4	17 0	20·6	49 0	16·33
6	10·6	20 9	20·9	52·4	17·46
7	12·8	26·1	21·7	60 6	20·20
8	11 6	25·7	23·6	60·9	20 30
9	14·2	26·0	24·8	65·0	21·66
10	12·9	26·7	24 9	64·5	21·50
11	13·4	18·0	20·2	51·6	17·20
12	14·4	20·2	24·5	59·1	19·70
13	13·1	19·4	24·1	56·6	18·86
14	12·8	19·6	23·2	55·6	18·53
15	11 6	18·6	23·8	54·0	18 00
16	13·6	18·4	24·2	56·2	18 73
17	14·4	18·6	25·6	58 6	19·53
18	14·2	17·8	23·3	55 3	18 43
19	13 6	15·4	23·5	52·5	17·50
20	12·7	15·6	22 0	50·3	16·76
Total Yield	255·2	383·3	442·6	1,081·1	360·31
Average per Acre	12 7	19·1	22 1	...	18 01
Rainfall from April to 31st October	3·82 in.	6·23 in.	11·23 in.	...	...

BREAD WHEATS.

Variety.	Yield, 1906	Yield, 1907.	Yield, 1908.	Yield, 1909.	Total.	Average.
Bunge No. 1	17·6	14 4	26 7	25 6	84·3	21·07
Crossbred 353	9·56	not sown	12·2	25·6	47·3	15·7
Moulds	13·4	4 9	16·9	24·0	59·2	14·8
Sussex	8 25	3·2	21·5	24 0	56·9	14·2
Hermitage	13·5	3·1	16·6	22·2	54·4	13·8
J. Brown	14·2	7·6	10 3	23·4	55 5	13·8
Crossbred 349	8·8	5·5	14·3	21 3	49·9	12·4
Bunyip	4·75	8·0	22·5	12·2	47·4	11·8
Plover	11·4	6·1	16·3	12·5	46·3	11·5
Rymer	8·5	6·3	13·0	16·2	43·0	10·7
Bobs	2·5	5·0	24·9	6·6	39·0	9·7
Crossbred 121	6·9	8·0	9·2	14·0	38·1	9·5
Schneider	13·4	4·5	10·0	10·0	37·9	9·4
Crossbred 348	10·2	not sown	11·5	6·6	28·3	9·4
Federation	2·75	6·6	26·0	2·4	37·7	9·4
Crossbred 33	rusted	3·6	12·2	21·4	37·2	9·3
Crossbred 343	7·4	4 7	8·8	15·8	36·7	9·1
Crossbred 12	14·0	3·8	7·6	10·0	35·4	8·8
Crossbred 181	8 06	3 0	10 7	11·6	33·3	8·3
Budd's Early	4·7	not sown	10·5	9·1	24·3	8·1
Cumberland	8·8	5 3	10 7	6·6	31·4	7·8
Manitoba	6·0	8·0	15·8	Nil	29·8	7·4
Crossbred 91	6·03	4·0	7·2	10·8	28·0	7·0
Crossbred 50	rusted	5·2	10·7	11·6	27·5	6·8
Crossbred 25	,,	4·0	10 0	11·6	25·6	6·4
Crossbred 55	,,	5·5	10·5	5·4	21·4	5·3
Tarragon	1·75	1·8	8·4	5·0	16·9	4·2

DURUM WHEATS.

Variety.	Yield per Acre, 1906.	Yield per Acre, 1907.	Yield per Acre, 1908.	Yield per Acre, 1909.	Total.	Average.
Cretan	23·7	5·7	10·4	16·5	56·3	14·0
V. Don	16 0	1·2	13·0	17·9	48·1	12·0
Kubanka	16·5	3 0	6·1	16·0	41·6	10·4
Morocco	13·8	4·0	9 6	10·4	37·8	9·4
Turkey	...	2·9	13 6	11·2	27·7	9·2
F. Durum	21·7	5·0	10·8	not sown	37·5	9·3
B. Don	17·6	3·1	5·3	6·6	32·6	8·1
Le Huguenot	...	6·7	4·1	8·3	19·1	6·3
Macaroni	11·25	1·1	...	not s wn	12·3	6·1
Yellow Gharnovka	...	4·3	5·3	2·9	12·5	4·1
Amantha	...	4·5	11·2	8·3	24·0	8·0

BARLEY.

None of this cereal was grown here this season.

OATS.

An acre of Garton's Universal and one of Garton's Bountiful Oats were grown—both doing very well. Owing to the fact that both were cut with the binder, and are still in the stack, nothing can be stated as to the yield returned.

LINSEED OR FLAX.

BY D. MACPHERSON, Manager, Biggenden State Farm.

Recent developments in the methods of harvesting and treating the fibre and seed of the flax plant make it probable that this crop will be found to be a distinctly paying one for Queensland. As the seed may be drilled or broadcasted, and the crop cut with a binder, it follows that these operations need not run into greater expense than they do for wheat, while the cash returns should be greater, as both seed and straw are of value.

In the "Victorian Agricultural Journal," May, 1906, the price of flax seed or linseed is given as 8s. per bushel, and the same Journal estimates the value of the fibre from 1 acre at £11 5s., and the cost of dew retting at 15s. per acre, and manufacturing £3 10s. Dew retting is, however, not always practicable here, as in some seasons there is practically no dew. This trouble is, however, likely to be soon overcome; and, if not already so, it soon will be possible to market the flax straw unretted.

From experiments carried out at this farm during the past three years, I am convinced that anyone having the necessary implements for handling wheat could also grow flax; and, so long as the market value of linseed did not go below that of wheat, would receive a better return per acre, even if the seed only were marketed, owing to the more certain yield from the flax.

Then, if we take into consideration the value of the fibre, and this is really the main product of the plant, and estimated in the Victorian Journal to be worth over £11 per acre, it must be admitted that there is every probability of the crop being a paying one. Another consideration, and one that should have considerable weight with us, is that the crop is less dependent on climatic conditions than any of the cereals.

Should the season be a wet one, it is probable that the crop of seed will ripen unevenly, and in this way a proportion of seed may be lost; but, even so, the yield of seed will still be a creditable one, and the crop of fibre will be extra heavy.

If, on the other hand, it strikes dry weather, neither the seed nor the fibre will be any the worse for eight or ten weeks of comparative dry weather before cutting.

Again, flax likes a warm free soil, and, as the soil on this farm is very stiff and heavy, it is more than likely that the results obtained here may be improved upon.

I give the results from an experimental plot planted here on the 3rd April, and cut on the 30th September. Also, the rainfall for the months between planting and harvesting. It may be mentioned that the seed did not germinate till after the rains that fell in the last week of May, so that the crop takes only four months from germination to harvest.

The plot sown contained 3 perches. A portion of this was cut before the seed was properly ripe for fibre samples, &c.

From the remainder (exactly 64 sq. yds.), 22 lb. of clean plump seed and 47 lb. of threshed straw was obtained, or at the rate of 27 bushels (60 lb. per bushel) of seed, and 31 cwt. 3 qr. of straw, to the acre.

I have, so far, been unable to get the fibre content of the straw.

Rainfall—April, ·34; May, 4·02; June, 5·24; July, 1·55; August, ·96; September, ·27.

I have grown flax here for the three past seasons, and the crop has every time given satisfactory results.

The last two seasons the large seeded Russian variety was grown, and the season before that the Riga.

ACETYLENE PLANT REFUSE.

Carbide utilised for the production of acetylene gas leaves as a residue hydrated oxide of calcium—that is to say, slaked lime. By the presence in small quantities of sulphur and phosphorus this residual lime, which is itself an excellent antiseptic, can therefore be used for the lime-washing of trees and bushes, with a view to the destruction of insects' eggs and parasitic larvæ, and of the mosses and lichens which cove them, and under which are sheltered a crowd of insects; for the white-washing of the interior of stables, cow-houses, pigsties, &c. In the poultry runs the whitewashing of shelters, perches, &c., ensures the destruction of vermin so prejudicial to the prosperity of the fowls. The residual lime taken from the acetylene apparatus may be considered as a fertiliser of the same kind as ordinary lime, and its employment should be made under the same conditions—that is to say, limited to those soils which are insufficiently calcareous, and to soils rich in organic matter; but it is necessary not to forget that the action of liming gives economical results only when the soil contains sufficient quantity of the divers elements of fertility—nitrogen, potash, phosphoric acid—without which it tends to fatal impoverishment of the soil, expressed in the old well-known phrase, "Lime enriches the father and ruins the children." The application of lime, therefore, ought to be reserved for those soils rich in fertilising materials, notably in vegetable matter, and only on exhausted soils after they have been furnished with strong doses of farm manure or chemical manure completed by the addition of phosphates and potash.—"Toowoomba Chronicle."

Dairying.

POINTS OF JERSEY CATTLE.

P. R. GORDON.

BULL.

As in my previous articles on point-judging the diagram illustrating the points of a Jersey bull and cow is borrowed from the contributions to the Press of my late friend, Mr. Alexander Bruce, who has gone more thoroughly and elaborately into the question of point-judging of stock than any other writer or association of breeders, and in elaborating his scales of points it is well within my own knowledge that he had the advice and collaboration of noted breeders of the various descriptions of stock in Australasia and the United Kingdom. In Jersey cattle he followed largely the points adopted by the Jersey Agricultural Society, which is the most carefully compiled scale issued by any breed society, and as is perhaps generally known, in its compilation the society selected two animals, one with a perfect hindquarter and the other showing a perfect forequarter, and from these two a schedule of excellence was compiled. Mr. Bruce, as in his scale for Ayrshires, adds points for breeding—namely, "Pedigree" and "Offspring"—thus necessitating a larger aggregate than 100 marks to properly assess the relative value of the various points, and therefore as in the two previous articles 250 has been adopted as the aggregate. The value of the two points mentioned are as essential in the Jersey as in the Ayrshire breed.

DESCRIPTION OF THE POINTS AND THEIR VALUES.

1. "Pedigree."—According to standing in Herd Book, or Certificates or Declarations—20 points.

2. "Offspring."—To be viewed from their or their parents' success at shows—20 points.

3. "Style and Character."—The general appearance, including style, character, and movement (the steps should be short, quick, and jaunty), should indicate purity of blood and high breeding, the whole figure being at the same time compact and well proportioned—20 points.

4. "Size."—The average live weight should be about 12 cwt.—5 points.

5. "Colour."—Silver-grey of a light shade, or a light lemon-fawn, free from white markings—7 points.

6. "Bone."—Light and clean under the knee—3 points.

7. "Hair."—Fine, soft, close, and wavy—4 points.

8. "Skin."—Rather thin, elastic, and moveable; but not too loose—6 points.

9. "Horns."—Smooth, crumpled, not too thick at base, tapering, and tipped black—3 points.

10. "Ears."—Small, thin, and of a deep-orange colour inside—2 points.

11. "Head and Face."—The head should be small, fine, and tapering, with hollow forehead and dished face and small cheek—5 points.

12. "Eye and Expression."—Full, placid, gentle, and deer-like—5 points.

13. "Nostril."—High and open—2 points.

14. "Muzzle."—Large, and encircled with rich, light-orange coloured hair, more particularly in the young stock—3 points.

15. "Neck."—Straight, fine, placed tightly on the shoulders, and free from loose skin on the throat, fine at the junction with head, and enlarging symmetrically towards the shoulders—9 points.

16. "Breast and Brisket."—Fairly full and deep—6 points.

17. "Crops and Withers."—Light but evenly filled—12 points.

18. "Shoulder."—Sloping and fairly covered with muscle—4 points.

19. "Forearm."—Swelling and full above the knee—4 points.

20. "Chine."—Light but symmetrical, and well defined—3 points.

21. "Foreribs."—Gradually increasing in width and depth backwards, and standing well out from the spine—4 points.

22. "Foreflank" or chest.—Deep, and running evenly out from the shoulder —3 points.

23. "Back."—Straight from the withers to the top of the hip, and from the top of the hip to the setting on of the tail—5 points.

24. "Back Ribs."—Hooped, deep, and round, and well ribbed home—6 points.

25. "Belly."—Capacious, but not low in the middle (*i.e.*, not "pot-bellied") —4 points.

26. "Loin."—Long, broad, level, and well covered—6 points.

27. "Flank."—Well let down—4 points.

28. "Hip."—Wide but not protruding—4 points.

29. "Rump."—Long, broad, and straight—7 points.

30. "The Tail."—At right angles with the back, full, and hanging down to the hocks—4 points.

31. "Quarter."—Large and wide behind—9 points.

32. "Thigh."—Deep, broad, and well developed, but not convex or protruding as in beef cattle—6 points.

33. "Twist."—Running well up, wide, and roomy—5 points.

34. "The Mirror or Escutcheon" should be large and well developed, and the higher the better—10 points.

35. "Testes."—Large—5 points.

36. "The Teats."—Moderate size, well apart, and not on scrotum—15 points.

37. "Knee and Hock."—Knee clean, firm, and fairly developed, and the hock long and broad, and nearly straight to the ground—4 points.

38. "Legs and Hock."—Below the knee, short, straight, and clean, and well under the body, and the hind legs squarely placed, not too close together when viewed from behind. Must not cross in walking—4 points.

39. "Hoofs."—Small, rather long, and straight—2 points.

Recapitulation.	Points.
Pedigree and offspring ...	40
Style, &c.	20
Size	5
Quality.	
Colour	7
Bone	3
Hair	4
Skin	6
Horns	3
Ears	2
Head and face	5
Eye and expression ...	5
Nostril	2
Muzzle	3
Forequarter.	
Neck	9
Breast and brisket ...	6
Crops and withers ...	12
Shoulder	4
Forearm	4
Chine	3
Fore ribs	4
Fore flank	3

Middle.	Points.
Back	5
Back ribs	6
Belly	4
Loin	6
Flank	4
Hindquarter.	
Hip	4
Rump	7
The tail	4
Quarter	9
Thigh	6
Twist	5
The Mirror and Escutcheon	10
Testes	5
The Teats	15
Legs, &c.	
Knee and Hock	4
Legs	4
Hoofs	2
Aggregate... ...	250

COWS AND HEIFERS.

The description and value of points in cows and heifers are the same as those in bulls, with the following important differences:—

In the females:—

No. 3. Style and character are allotted 10 points.
No. 4. Size—Live weight should average 9 cwt. when in full milk.
No. 15. Neck—5 points.
No. 16. Breast and brisket—5 points.
No. 17. Crops and withers—5 points.
No. 18. Shoulder—3 points.
No. 19. Forearm—2 points.
No. 23. Back—4 points.
No. 24. Back ribs—4 points.
No. 25. Belly—2 points.
No. 26. Hips—3 points.
No. 29. Rump—4 points.
No. 30. Tail—3 points.
No. 31. Quarter—5 points.
No. 32. Thigh—5 points.
No. 34. Mirror and Escutcheon—5 points.
No. 35. Udder—Full (but not fleshy) in form—*i.e.*, well forward, in line with the belly, and well up behind—40 points.
No. 36. The Teats—Moderate size, large enough to be held in the full hand, squarely placed behind, and wide apart—10 points.
No. 37. Milk veins—Very prominent, and well developed about udder and abdomen—15 points.

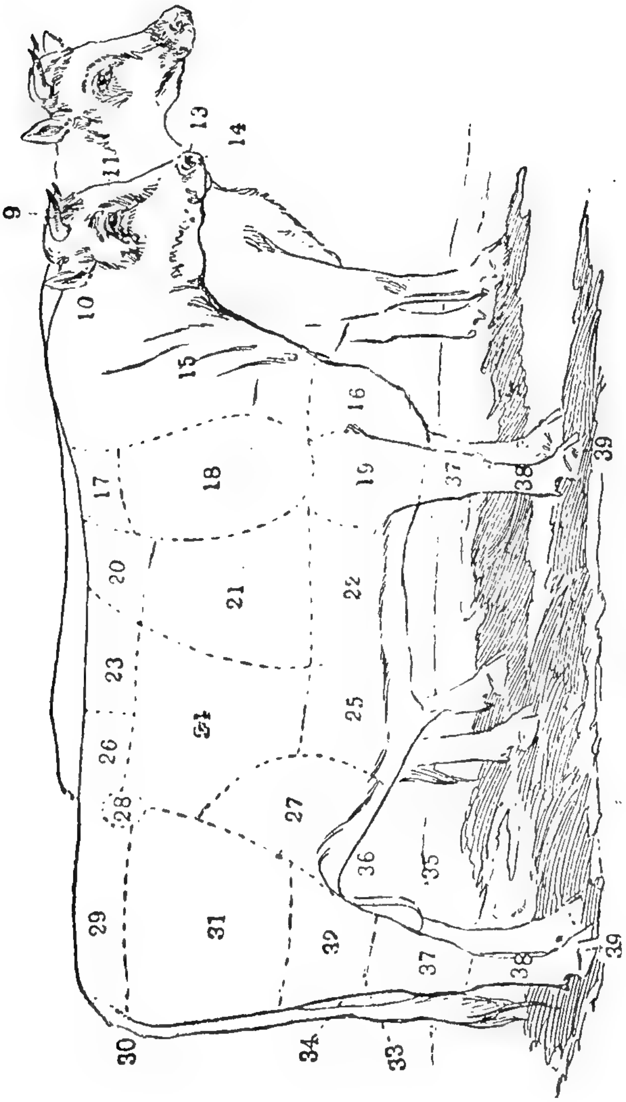
THE ANGORA GOAT: ITS USES AND VALUE.

Increasing attention is being given in Queensland to the breeding of Angora goats, and it is probable that in course of time the industry here will assume fairly large proportions. In a paper read at Toowoomba some time ago Mr. W. R. Robinson mentioned that at one time there were some beautifully bred Angoras at Talgai, but they had dwindled out. He added that there were still some flocks in Australia which the owners had reason to be proud of, notably those of E. A. Scammell, of South Australia; R. Blaxland, New South Wales; H. Missing, near Maryborough; H. Philp, Grantham; J. R. Chisholm, The Prairie, North Queensland; and G. H. Simpson, Toowoomba.

The first question usually asked about the Angora is "How much will they clip?" On this point there appears to be a great diversity of opinion, because the yields vary considerably owing to the quality, age, and sex of the animals. Dr. C. P. Bailey, who went from the United States to Asia Minor for the express view of inquiring into the Angora industry in its home, visited among other farms that of Moustafa Bey, near Eski Chehir, one of the most progressive farmers in that country. His report states, "The foreman of this farm said that the best bucks sheared 8 lb. or 10 lb. of mohair a year, and the best does about 4 lb. or 6 lb. He said that they had selected the heaviest shearers each year, and that they had disposed of some of the poorer ones to their neighbours. The flocks averaged about 3¼ lb. per year. Men came from Kjutiah, a day distant, to get bucks from this flock." These figures may therefore be regarded as indicating the yield of a good average flock.

The Turkish Government has since 1881 prohibited the export of goats out of the country, but this can probably be overcome if approached in the proper manner—at any rate, the Dr. Bailey already referred to purchased four stud animals and safely got them to America, where they joined his flock at St. José, Southern California, in 1901.

Plate V.



Points of Jersey Cattle.

The above plate represents a Jersey Bull and Cow, with the points approximately indicated on the plate of the bull; the numbers appearing on it corresponding with those given in describing the points and setting out their relative values.

The following extract from a report by H. A. Cumberbatch, British Consul at Angora in 1905, will indicate the conditions of the climate in the natural home of the Angora: "The climate is extreme. In the months of January and February the thermometer will mark a minimum of 10 deg. Fahr. for several days at a time and reach as far zero, whilst in June and July the maximum readings of 85 deg. are maintained day after day. The country is covered with snow in the winter, rain and snow falling frequently. In 1894 the total rainfall at Angora was 8·12 in., but that was an exceptionally dry season. For the first six months of 1895 the rainfall was 10·10 in., which is somewhat above the average."

That the altitude, the soil, the climate, or all of them together, had much influence in producing the fleece-bearing goat of Angora is supported by strong evidence. Dr. John Buchanan and the "Encyclopædia Britannica" both state that the fineness of the hair of the Angora goat may perhaps be ascribed to some peculiarity of the atmosphere, "for it is remarkable that the cats, dogs, sheep, and other animals of the country are to a certain extent affected in the same way as the goats." Probably the food has quite as much to do with the fineness and length of the hair, for we know how the feed affects the fleeces of sheep in our own country.

A Flock of Browsers.

In selecting country for raising Angoras it must be remembered that they are browsers, not graziers—that is, they will for choice eat leaves, twigs, shoots, and bark, and take grass only as a tonic or to fill up when other food is scarce. For that reason they are largely and profitably used in the United States to clean brushy country, which they do most successfully. In New Zealand they have been used similarly for clearing land infested with blackberry, which is there very troublesome in places. They have also been tried in Queensland for clearing lantana, the plant being cut down, and the goats left to nibble off the young shoots as they spring from the roots. So far as can be gathered the common goat will do this to a certain extent, but if crossed with the Angora it becomes less and less effective the nearer the breed approaches the pure Angora.

Fleeces and Shearing.

The country best suited for the Angora is scrubby, hilly country, and they will thrive in any climate that is fairly dry—wet does not suit them. As animals of pure breed are difficult to get, it may be advisable to people with small capital when starting a flock to secure the best bucks available and use the common goats for females. Then in turn the half-bred females are crossed again with pure bucks, and so on till a profitable flock is established. Dr. C. P. Bailey, writing on this subject, says:—"Half-bred goats scarcely shear enough to pay for the shearing; three-fourths bred goats shear 1 lb. to 1½ lb., worth 7d. to 10d.; seven-eighths bred goats shear 2 lb. to 3 lb., worth 10d. to 1s. 3d.; fifteen-sixteenth bred goats shear 3 lb. to 5 lb., worth 1s. 3d. to 1s. 8d."

It is claimed that the Angora in Cape Colony and the United States yields a heavier fleece than in Turkey. Mr. S. C. Cronwright Schreiner, of South Africa, who is an authority on the subject, says with reference to Turkey:—"It would seem that 14 lb. for rams and 8½ lb. for ewes are about the maximum weights of really first-class fleeces, and that if these weights are much exceeded the quality of the hair is inferior and a good deal of the weight is due to oil and dirt." In South Africa buck fleeces have surpassed 15 lb. and doe fleeces 11 lb. These big variations indicate that in mohair as in wool-growing there is a great deal of room for raising and maintaining the standard of flocks.

Small flocks are said to give better results than large ones; and the percentage of kids to does ranges from 70 to 100.

The Angora will naturally shed its hair if left untouched, and the shearing should therefore take place before this begins, for the mohair otherwise loses its lustre, and itchiness of the skin will make the animal rub its covering off wherever it can. If shearing takes place twice a year a little more hair is obtained, but it is shorter and therefore brings a lower price.

The record price for Australian mohair, says Mr. W. R. Robinson, is 4s. 2d. per lb. This price was lately realised by Blaxland Knox, of New South Wales, for a fleece from their imported buck Perfection, the fleece weighing 9 lb. 8 oz.; and the skirted portion 6 lb., was forwarded to a New York merchant, who paid a dollar (4s. 2d.) per lb., leaving a net return of £1 0s. 2d.

There is as good a market for mohair as for wool and the same firms in Queensland will handle the clips of either. As there are 300,000 Angoras in the United States and 4,000,000 in South Africa, as well as those in Turkey and flocks scattered about the world generally, the difficulty of obtaining good specimen animals is merely one of cost.

RETURNS IN AMERICA.

The following extracts from an article in the "American Agriculturist" will indicate how the Angora is regarded in the United States:—

"Probably the most pronounced and useful trait of the Angora goat is its ability to free pasture of weeds and brush. A bulletin of the United States Department of Agriculture claims that forty goats will clear as much land as a man with a mattock, and do it much better. The goat is the only animal that will take the job of clearing land and pile a great portion of the brush and weeds in his shed as manure, and ask nothing for doing it. All he asks is a dry place to sleep, which he will go to himself, and some feed when it is too wet for him to go out. For this he gives up a fleece of hair, worth from 4s. per lb. up, and each year another grubber, in the form of a lusty kid. The goat will eat any feed that any other animal will eat, and a great deal that no other animal will touch, but it must be clean. In summer he will eat all kinds of brush and weeds and leave the grass for the other animals. In the winter he will eat the tops off of all the weeds to get the seeds and the twigs and ends of all brush and briars and the bark from a great many saplings, peeling them up to 6 ft. high. Any good fence will turn them; they are more apt to crawl under than jump over, but when they once learn to jump they are good at the job. A woven wire fence 3 ft. high is an ideal goat fence. Angora goats breed but once a year and usually bring forth their young in late winter or spring, usually one, but sometimes twins. The kids are delicate when first born, but when once filled with mother's milk will stand lots of exposure. The fleece of the Angora goat is called mohair, and they shear from 1½ lb. to 21 lb. The average in America is between three and five pounds for one year's growth, and it is from 3 in. to 22 in. long, the average being somewhere between.

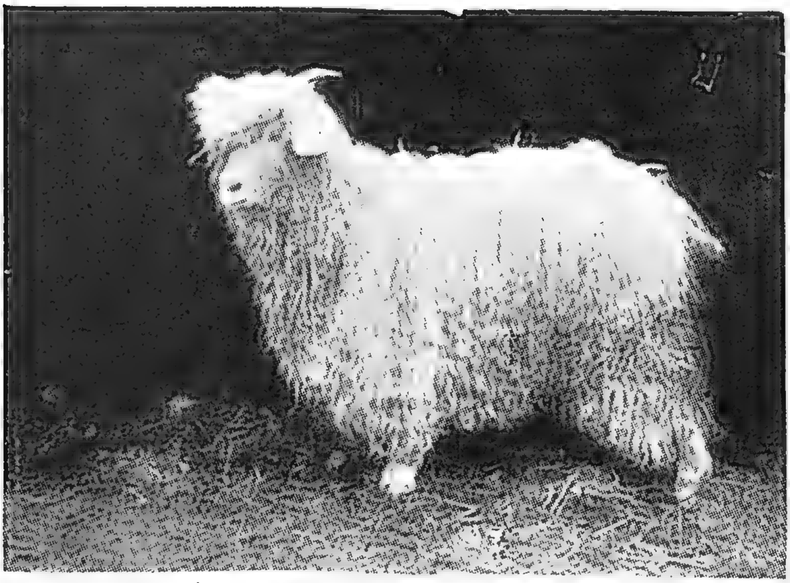
"The price of mohair varies as much as the weight of the fleece, and ranges from 8d. £1 7s. per lb., the former price for six-months-old goats of poor hair, and the latter the price paid a Montana firm for two fleeces that weighed 42 lb. The goat that took the premium at the St. Louis world's fair clipped 19 lb. of hair that sold for 19s. per lb. Tom Wedgewood, of New Mexico, had a buck that sheared 16 lb. of hair, 10 lb. of which sold for £1 1s. per lb. Mrs. Armour, of New Mexica, had a doe fleece that weighed 14 lb., and sold for £8 15s. 4d. (For the illustrations we are indebted to the Brisbane Newspaper Company.)

Plate VI.

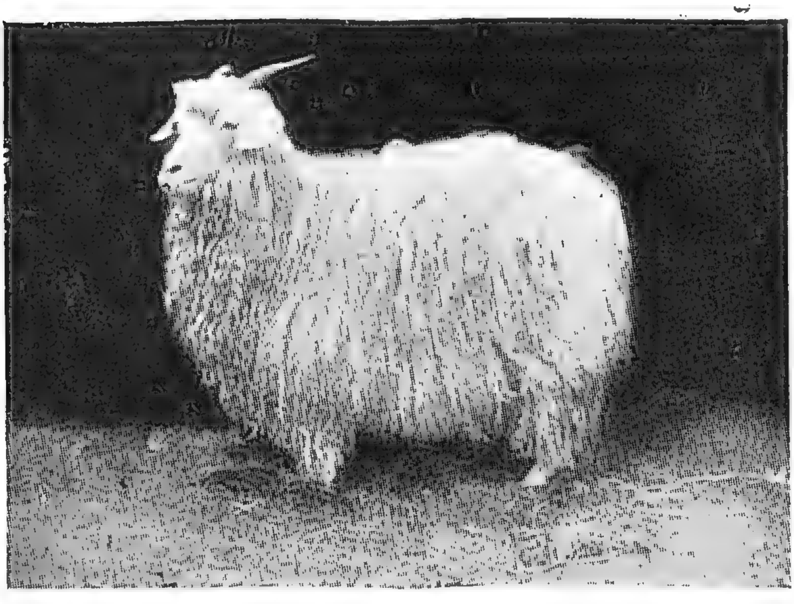
ANGORAS IMPORTED INTO CALIFORNIA IN 1901 BY DR. BAILEY.

A YEARLING ANGORA IN CAPE COLONY.

Plate VII.



Angora Doe, Princess Monterey, Ten Months Old. Fleece, 4½ Lb.



Angora Doe, Madam Ladysmith, Three Months Old. Fleece, 8 Lb.

THE JERSEY-HEREFORD.*

The accompanying illustration reproduced from a photograph sent us by Mr. Munro Hall, Toowong, depicts a type of a breed of dairy cattle, concerning which Mr. Hall says:—"Amongst the various breeds and cross-breeds that find favour with the dairyman, I have not noticed the Jersey-Hereford strain. I send you herewith a photograph of such a cross, whose mother was a big bugle-horned Hereford from Kenilworth (Mary River), and a remarkably good milker, both as regards quality and quantity. The sire was a Jersey. I milked the cow for thirteen years, during which time she only missed calving once (owing to the dry spell in 1903).

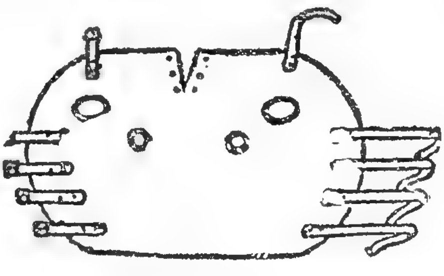
Unfortunately, however, she only threw two heifers, one of which died during the drought, and the other, the original of the photograph which is now five years and nine months old. She has been milking since 3rd May last, and will calve again early in May next. She is now giving 17 lb. of milk daily, from which, after deducting home supply of whole milk, I churn a few ounces over 1 lb. of butter every second morning. Beyond lucerne chaff no "feed" is given. Spot, as the cow is named, possesses a Flanderine escutcheon, and the difficulty of drying her off would point to the truth of Guenon's assertion, that "cows with such an escutcheon should milk for an indefinite period."

So far, her progeny, of which there are four, have been equally paired, beginning with a bull, prematurely calved, next a heifer, Buttercup, by Gordon's Jersey milking strain. The third was a bull calf, Peter Pan, by Carr's Shorthorn, and the fourth a heifer, Primrose, by Carr's Jersey.

VICIOUS BULL APPLIANCE.

The "Queenslander" reproduces from the "Leader" the accompanying illustration of a method of rendering a vicious bull safe by means of a hood. The writer of the article, Mr. E. Williams, explains it thus:—

This hood system subdues the most vicious bull. I own a bull which at one year of age showed an ugly disposition. I had him dehorned, and yet at two years of age he wears a hood, having made a determined effort to kill the milkman. Bulls are dangerous when carelessly handled, and so are some



cows if they have not been handled when young. The hood is made of good harness leather; in width 28 in., in depth 18 in., the holes 3 in. in diameter, and the horn $2\frac{1}{2}$ in.; these are 5 in. apart, measuring to the centre, and 8 in. between the horns. The edges should be smooth, that there be no abrasion of the skin about ear or horn from an uncomfortable fit. If too large, a gore a few inches in depth can be taken out and then laced. Or, a better way is to cut and bevel opposite edges and lap over to a snug fit, and rivet. Four oil-tanned hame strings are riveted one side, and four short double pieces,

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* A photograph of the cow will appear in the next issue of the Journal.

with a loop, on the opposite side. The hood is laced under the jaw and securely tied. Bulls that are inclined to be ugly lose their viciousness in the second or third calving after the sire has been hooded. Valuable cattle are made still more valuable when this hood is adopted, for under no restraint at the prime of the bull's life his procreative power is gone; the investment of money for a thoroughbred that, unrestrained, lasts but two or three years, is different when that animal's service is good to old age. A well-bred bull costs a good deal of money, and there is a heavy loss when he has to be sold for sausage meat.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1909.												1910.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
North.													
Bowen	15·48	4·52	1·06	1·15	2 32	1·98	1·23	0·13	0·21	0·36	3·15	19 98	15·45
Cairns	32·05	5·25	21·03	14·19	1·06	2·48	0 65	2·48	0·7	3·19	7·31	15·24	21·80
Geraldton	47·92	10·29	37·31	28·51	5·98	9·13	6·53	5·32	0·36	6·71	14·57	19·98	20·35
Gindie State Farm ...	...	...	...	...	...	...	...	...	...	..	...	...	...
Herberton	12·41	2·28	3·52	0·70	0·81	1·22	0·20	0·75	0·50	2·30	4·50	5·11	16·64
Hughenden .. .	7·55	1·55	2·86	...	Nil	1·71	1·37	0·33	0·8	1·95	0·54	8·01	4·52
Kamerunga State Nurs.	...	3·52	...	4·95	0·97	...	...	...	...	...		...	...
Mackay	15·00	1·36	9·00	2·59	2·33	2·05	4·00	0·75	0·73	2·88	3·18	25·56	35·28
Rockhampton	9·01	2·01	1·68	1·21	0 03	1·33	2·99	1·37	1·20	2·16	4·55	2·74	11·93
Townsville	6·94	1·70	7·01	1·28	1·07	1·51	0 83	0·57	0·12	2·07	1·31	11·51	23·07
South.													
Biggenden State Farm	7·37	2·68	2·45	2·00	0·72	2·60	4·01	1·78	0·29	...	2·83	6·06	7·22
Brisbane	1·99	2·72	2·65	4·67	0·82	1·75	2·10	2·44	2·74	1·56	4·14	6·45	7·24
Bundaberg	6·52	3·70	5·06	1·54	0·67	1·51	5·65	1·66	0·98	0·42	3·55	2·99	11·81
Dalby	1·46	3·55	0·99	1·60	Nil	1·87	1·19	3·13	0·47	1·92	2·13	2·45	10·88
Esk	2·64	3·21	3·27	5·03	0·36	2·43	2·74	3·31	2·60	2·61	2 69	9·20	8·60
Gatton Agric. College	1·94	5·00	3·18	3·82	0 32	1·22	2·02	2·09	2·29	1·87		3·92	11·79
Gympie	3·86	3·77	3·41	2·34	1·15	2 96	4·70	2·80	1·70	2·30	3·82	16·54	5·92
Ipswich	1·37	1·95	2·66	4·56	0·05	1·31	1·67	1·34	3·55	1·93	1·56	4·72	6·91
Maryborough	8·36	7·11	2 28	2·4	0 91	2·57	5·02	2 53	1·56	0·51	3.94	6·83	5·65
Roma	5·19	4·85	4·18	1·91	0·44	2·73	1·54	4·83	0·12	0·90	2·12	1·05	4·74
Roma State Farm ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tewantin	6·44	3·31	4·34	9·37	1·00	3·24	4 08	4·24	1·38	3·82	1·90	8·85	5·96
Warwick	0·87	0·82	1·30	2·21	0·70	1·23	2·04	2·28	1·77	2·85	2·77	4·25	3·93
Wellington Point ...	...	...	...	...	...	...	...	...	...	...	...	9·00	...
Westbrook State Farm	...	2·61	1·43	...	...	...	...	...	...	...	...	...	...
Yandina	6·69	6·42	3 71	5·25	1·10	2·70	3·70	5·81	3·84	2·30	0 76	20·18	6·71

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND,
Divisional Officer.

Poultry.

HOW TO JUDGE THE AGE OF A FOWL.

To tell the exact age of a fowl to within a few weeks is a matter of impossibility; but to be able to state with definite accuracy whether a fowl has passed the first moulting stage is a comparatively easy matter to those possessing the requisite knowledge of how to set about it.

Writing on this subject, "Feathered Life" says:—"In no single item connected with show stock does the average breeder display such lamentable ignorance as in the matter of defining age. In the case of a male bird he professes to be able to arrive at a correct decision per medium of his spurs—the most unreliable test of all. Examination of this feature in a season's crop of cockerels will disclose the fact that in many cases specimens of the younger broods show considerably longer spurs than are possessed by others several months their senior, and, again, many adult cocks' spurs are shorter and less pointed than those worn by nine-month-old cockerels.

Regarding the female, in whose connection no such palpable evidence exists, he contents himself by guessing at her probable age, and in many cases, as the result of sheer luck, approaches somewhat closely to it. In some instances—notably in the case of black-shanked breeds, such as Minorcas, Black Orpingtons, &c.—the change in leg colour from black to light leaden hues is accepted by the inexperienced as marking the attainment of the adult stage of existence, whereas, owing to various causes—such as time of hatching nature of soil on which the bird is raised, &c.—such change frequently takes place as early as the eighth or ninth month of the bird's life.

In the case of a pullet, the surface under the wings will always be found interspersed with minute rose-coloured veins, which are totally absent in birds that have passed the twelve months' distance post of their carreer. Again, there will be found, in the case of the pullet, a fair supply of long silky hairs, which disappear directly the first moult is concluded. In the adult hen the skin will be found to be perfectly white, and free from either veins or hairs; hence, it is easy, at a single glance, to correctly estimate whether a bird is under or over the age that acts as a line of demarcation between juvenile and adult stock. Additional evidence is forthcoming in the formation of the pelvic bones, which, in a pullet, are much closer than in the hen that has passed the pullet age. At two years they are much wider than at one year, so that birds at this age can be readily distinguished from those of, say, fifteen and eighteen months. The third point of difference is observable in the shanks and claws. In the young bird the skin of the claw is supple, and the scales are thin and brilliant. The skin gets coarser and stronger, and the scales harder, as the bird grows, and the nail of the last toe, which does most of the work, gets much worn. There is also a difference in the eyelids. These acquire wrinkles as the bird gets older, and there is also a slightly shrivelled look on the face. This, with age, becomes more and more pronounced. Lastly, there is the question of wing feathers—the most infallible test of all. At the conclusion of the first complete moult, which takes place when the fowl is exactly twelve months old, the secondaries alter in shape, and bear indisputable evidence as to the dividing line having been crossed. Although the surest test of all, this latter can only be ascertained by those well versed in handling feathered stock.—"Farmer and Grazier."

The Orchard.

FRUIT-GROWING IN THE BURRUM RIVER DISTRICT.

By ALBERT H. BENSON, M.R.A.C.

When travelling by rail from Maryborough to Bundaberg by the North Coast line, the average man is not greatly impressed by the fertility of the land through which he is passing, and, if a stranger to the district, he is much surprised when he is told that the land on the banks of and adjacent to the Burrum River and its tributaries produces some of the finest citrus fruit that is grown in Australia. Such, however, is the case, and, being so, I think that a short account of the district may be of interest to readers of the "Queensland Agricultural Journal."

The Burrum River is crossed by the railway some thirteen miles from Maryborough, and the stations at Burrum and Howard, the one to the south and the other to the north of the river, are within easy reach of the orchards that are along the banks of the river, both above and below the bridge.

The Burrum River is situated in the Wide Bay district, and this district was the first in Queensland that made a serious attempt to place its citrus fruits on the Southern, and particularly the Melbourne, markets, an attempt that met with such success that to-day, and for some years past, the term "Maryborough orange" is used to imply that the fruit is of superior quality and the best obtainable. All citrus fruits grown in the Wide Bay District are known in the Southern markets as "Maryborough," owing to the fact that the whole of the fruit exported from the district was, until quite recently, shipped from the port of Maryborough. Now, however, a considerable portion of the crop is railed to Brisbane, and is shipped thence by the larger coastal boats to the Southern markets, thus saving the handling on the small boats that ply between Maryborough and Brisbane. The name, however, still remains, and the fruit grown in the district continues to enjoy a high reputation for quality, and to realise a satisfactory return to the growers.

There is a considerable area of land adapted for citrus culture on and adjacent to the Burrum and its tributaries—the Isis, Gregory, and Churwell. As a rule there is no large area of suitable land at any one spot, but there are a number of patches of land on both banks of the Burrum and on its tributaries that are now growing, and can be made to grow, citrus fruits to great perfection.

These patches of land are, as a rule, alluvial, and were covered originally with a moderately heavy scrub, the bulk of which has now been felled. There are also patches of forest, with deep, sandy, alluvial soils, and sound, free, sandy, loamy ridges lying back from the rivers, which though not as rich as the alluvial, are still capable of growing good fruit.

Generally speaking, the alluvial land does not extend any great distance from the river banks, and is backed up by poor forest country that gradually turns to Wallum. The soil, taken as a whole, is a deep, free, sandy loamy alluvial, having good natural drainage, and situated, as a rule, above ordinary flood level. Heavy floods, however, go over some of the land, but, as there is no great rush of water, and the water does not remain long on the land, they do no damage to speak of. As is the case in most Queensland rivers, the banks of the rivers are the highest, and, as a rule, have the freest and deepest soil, which gets heavier as the land falls, and again lighter as it rises towards the adjacent forest. Very little of the alluvial scrub land is, however, too heavy for citrus fruits, but should it be so it is excellent land for corn, sorghum, pumpkins, potatoes, all kinds of vegetables, and artificial grasses, so that it can be worked to advantage in conjunction with the freer soils that are better

Plate VIII.

Mr. Richard's Launch, Burrum.

adapted for citrus culture. The bulk of the orchards are on the banks of the Burrum itself—two or three above and the balance below the railway bridge. They are scattered over some miles of river frontage, and as they are on both banks they are most easily reached by water. The river is navigable right from the heads to a short distance above the bridge for boats of shallow draught at any state of the tide, and I was fortunate enough to have a roomy motor boat, belonging to Mr. N. C. Richards, of the Ark Orangery, Howard, placed at my disposal.

This is decidedly the best and most pleasant method of visiting the different orchards along the river, and it saves a lot of time.

Starting from the railway bridge and proceeding down the river the first orchard met with is that of Mr. Stafford, which is on the north bank. There are a few very large orange and Emperor mandarin trees (seedlings) near the house that bear heavy crops of fruit; also a number of trees in bearing on the river bank. The bulk of the orchard is not yet in bearing, and consists of worked trees of the best kind, which are doing well. Mr. Stafford cyanides regularly for scale, and has been successful in the use of the lime and sulphur wash for the trunks and main branches. The orchard is in good order, and is well looked after.

Proceeding down the river the next orchard met with is on the south bank, and was planted by the late Captain Walker. It is now divided into two holdings, that are in the possession of Messrs. Tench and Ross. This orchard is a striking instance of how much neglect orange-trees will stand and yet recover and continue to grow good crops of fruit. Some twelve years ago it was purchased by Messrs. Tench and Shaw, and was then in a very neglected state. The trees were full of dead wood and covered with pests of many kinds, and the ground was a jungle of weeds. Three years' hard work brought the trees round and got the land into good order, but no sooner had this taken place than the big drought struck them, and at one time it looked as if the trees would never recover. Heavy pruning, irrigation, and manuring, combined with steady plodding work, however, brought them round, and since then the trees have borne yearly crops of good fruit. The trees are cyanided regularly, irrigated when necessary, manured, sprayed, pruned, and looked after properly, and now the orchard never looked better and is carrying a fair crop of good quality fruit. This orchard is an object lesson, as it shows not only what hardship an orange-tree can undergo and yet recover, but it shows what hard work and perseverance can accomplish when backed up by intelligence.

Mr. Shaw sold out his portion of the orchard some years since to Mr. Ross, who has extended the area under trees. The young trees did not do too well at first but are now coming on well, and will, eventually, make a fine orchard.

Proceeding down stream the orchard of Mr. Watkins is noted on the north bank. The bulk of the trees are seedlings, which are a picture of health, and bearing a heavy crop of fine fruit, both oranges and mandarins. The soil is a deep sandy loam with perfect drainage, and, though the trees have not received any manuring to speak of so far, the heavy crops of fruit they are growing will eventually deplete the soil of its available plant food, and manuring will be necessary to maintain the trees in full vigor and heavy bearing. There are a number of younger trees which are also coming on well. The orchard is regularly cyanided, and scales of all kinds are kept in check. A short way down the river on the same bank "Sheffield Orangery," the home of the late Henry Smith, one of the Burrum pioneers, is reached. At Mr. Smith's death the orchard was divided amongst his sons, Messrs. W., H., and T. Smith, and his son-in-law, Mr. Hamilton. The fruit from the Sheffield Orangery has made a name for itself, and I am sorry to see that the trees have been somewhat neglected in parts, and show evidence of the want of systematic manuring. A few trees show signs of mal-di-goma or

collar rot, but, taken as a whole, the roots even of the oldest trees are yet sound, and the trees only want feeding, care, and attention to again produce good crops of the highest quality fruit. Cyaniding is carried out, and lime and sulphur is used for the trunks and main branches. Irrigation is also used when required. Vines of the American type have been grown successfully for a number of years, and yield a fair return. Adjoining the orchard of Mr. H. Smith is that of Mr T. Reaney. This is quite a new place the oldest trees being only planted in 1908. The soil is suitable for fruit culture, and if the young trees are well looked after there is no reason why this should not become one of the best orchards on the Burrum. The next orchard to be reached is that of Mr. C. Christensen, on the south side. The bulk of the trees in this orchard are worked trees, not seedlings, and they are now beginning to bring in a fair return. The soil is a rich free alluvial loam, and the trees have made good progress. The orchard is kept well worked, and scale insects are kept in check by cyaniding. Red scale was at one time a serious menace, but it is now pretty well wiped out by the cyanide. The trees are laden with fruit, which was well advanced at the time of my visit. There was quite a quantity of second-crop fruit in this and some of the other orchards on the river; a crop that is more bother than it is worth, as it is more or less badly attacked by fly, which renders it unsaleable. In most cases it will pay to pull this off-season crop as soon as it sets, as it seldom comes to maturity without being attacked by the fruit fly, and thus forms a medium for carrying this pest through from season to season.

On the opposite side of the river are the orchards of Messrs. Walker, Bilsbury, and Kalmund. The first of these is on a rather stronger soil, and the trees (seedlings) have been allowed to grow pretty much as they liked. Latterly the ground is being well cleaned and the trees pruned out and cyanided, with decided beneficial results, so that ere long they should be bringing in a satisfactory yield. Mr. Bilsbury's orchard is also one that has newly come into bearing, the trees are mostly seedlings, are well looked after, and are kept well cyanided Red scale has been fought out here by cyanide, which, as far as my experience goes, is the only remedy for this, the most deadly scale insect that the orange-grower has to deal with.

Mr. Kalmund's orchard is quite a young one, and the trees are not yet in bearing. So far the trees are doing well, and more will be planted. Between this and the next orchard, that of Mr. N. C. Richards, there is a considerable break, the country passed through being comparatively poor right up to the river banks. When, however, Mr. Richards's Ark Orangery is reached there is a fine alluvial flat planted with 1,200 worked and seedling citrus trees, besides a few mangoes and other fruits. The soil is a good free loam, and both the land and trees are kept in good order; the former by cultivation and manuring, and the latter by cyaniding and spraying. Many of the citrus trees are of large size and yield heavy crops of fruit, and both seedlings and worked trees respond well to the application of manure. This orchard was commenced some years ago by the late Mr. Noah Richards, father of the present owner, and has been gradually extended till it has now become one of the best orchards of its size in the State.

Systematic manuring is found to be a profitable investment, as the trees not only bear heavy and regular crops of fruit but at the same time they are sufficiently vigorous to produce a good growth of wood on which to carry the succeeding year's crop. The trees have that good, dark, vivid green colour indicative of vigorous health, and are carrying a heavy crop of fruit, both oranges and mandarins.

Just across the river, a little further down, is another of the old Burrum orchards—that of "Ellendale," the property of Mr. Burgess. Right on the river bank, in a deep free sandy soil, there are a number of old seedling oranges and mandarin trees that have grown some of the best fruit that has been produced in the district, amongst them the Beauty of Ellendale, a cross

between an orange and a mandarin, with fruit of large size, great beauty, and high flavour; but, unfortunately, the tree has a bark that is especially attractive to a species of elephant beetle; the larvæ of which literally riddles the trunks and main branches.

Back from the river bank there are a number of young trees, some in bearing and some only recently planted, which are looking well, though some of the worked trees have been a failure, evidently owing to defective stocks; as where worked on good seedling orange roots the trees are doing all right.

There are no orchards further down the main river, though there are several on the different tributaries of which that of Mr. J. Lamb of Abingdon, on the Upper Isis, is the best known. This orchard is on the banks of the river on free sandy loamy soil, and produces excellent oranges and mandarins. There is also an orchard belonging to Mr. J. Leeson on the Shurwell, at no great distance from Mr. N. C. Richards by land, but many miles round by water; where there is a fine patch of young orange trees, and some really good garden soil for vegetable growing. There is also a new orchard being planted near the mouth of the Gregory, and there are many pockets along the banks of these tributaries of the Burrum that are suitable for citrus culture.

On the upper portion of the Burrum, above tidal water, there are patches of country that will grow good oranges—for instance, the orchards of Messrs. Flint and McKenna. The soil is a deep free sandy loam, and trees do well when propertly attended to and manured, as shown by the healthy state of Mr. McKenna's trees when I visited his orchard some months since.

In addition to the growth of citrus fruits, corn, sorghum, English and sweet potatoes, pumpkins, peanuts, and vegetables of all kinds are grown to a certain extent, and when the ground is well worked and manured these crops yield satisfactory returns.

The bulk of the citrus trees grown on the Burrum and in the surrounding district are seedlings, both oranges and mandarins of several kinds, but latterly quite a number of worked trees have been planted, and the following varieties have been found to do well, and to be regular and heavy bearers—viz., oranges—Valencia Late, Jaffa, and Washington Navel, the latter when well manured; and mandarins—Emperor and Scarlet. The Emperor mandarin does especially well; but the Beauty of Glen Retreat and the Thorney, though heavy bearers, are not satisfactory.

Many other varieties of oranges and mandarins have been tried, but the above list is the pick of the lot. Worked trees require more feeding and better attention than seedlings, but come into bearing earlier and produce more regular crops. As already stated, thorough manuring is found to be a very profitable investment, and cyaniding and spraying are depended upon to keep the trees free from scale as well as from other insect and fungus pests. Irrigation is of value during a dry spell, and especially during the spring, shortly after blossoming, as a good soaking then tends to set a heavy crop of fruit. There is usually a good supply of suitable water at no great distance from the surface, and in the case of those orchardists who have used it, it has been pumped by hot-air engines. The supply obtainable by these means has not been great, but has proved sufficient to carry the trees through all the dry spells we had at the commencement of this century. The fruit-growing industry in the Burrum district is steadily increasing, and growers realise that, in order to make the industry a profitable one, it is necessary to give every attention to the trees; as a tree well pruned, manured, cultivated, cyanided, sprayed, and irrigated when required will produce a heavy crop of high-class clean fruit that is a credit to the grower and the district; whereas a neglected starved tree will not produce enough to pay expenses, and even what it does produce is frequently so scaly and inferior that it is unsaleable.

Burrum orange-growers have already made a good name for their produce, and it is to their interest to maintain a good name; this can only be accomplished by keeping up the quality of the fruit, and to do this the orchards

must be looked after properly, and the trees must be both fed and kept clean. If this is done then there is no reason why those who are now growing fruit should not make a very good living thereby, and that those who are looking for a place to start new orchards would do well to have a look at the district before deciding on going elsewhere.

FRUIT-GROWING IN THE GYMPIE DISTRICT.

By ALBERT H. BENSON, M.R.A.C.

Steadily, but surely, a good change is taking place in the Gympie district. The gold mines that have been the mainstay of the town and district for the past forty years are not now the only source of wealth, as agriculture in all its branches is coming rapidly to the front. Gold has been mainly looked for in the past in the rocks that underlie Gympie, but the gold that is in the soil has been neglected. Now people are beginning to realise that the progress of the district depends largely on the development of the land, the principal source of wealth in all districts. General farming, dairying, fruit and vegetable growing are all extending, and there are still large areas of land in the district at present undeveloped which are capable of yielding a rich harvest if properly worked by intelligent agriculturists.

During the month of December last I paid a visit to Gympie, and whilst there was driven to many of the outlying parts of the district that I had never visited previously. I was agreeably surprised with what I saw, as I had no idea that there was such a large area of good land in the neighbourhood, land that is suitable for dairying and mixed farming, and what was of even more interest to me personally, land that is well adapted for the growing of citrus fruits, pineapples, and bananas. I do not wish to infer that all the country I saw was good, as this would not be correct; but I saw a considerable area of land in different parts of the district, that added to the good land I had seen on previous visits shows me that there is a good opening for many intelligent farmers, dairymen, and fruit-growers. This being my opinion, I think that a short account of country that I have visited near Gympie, together with my idea as to the suitability of the soil for general farming and fruit-growing may be of interest to readers of this Journal.

Leaving Gympie I proceeded in an easterly direction following the valley of Deep Creek up as far as the homestead of Mr. J. Dundas, where I inspected a small orchard, mostly seedling citrus trees, situated on a gravelly quartz ridge, forest country. Where given a little farmyard manure the trees were of a healthy colour and bearing good fruit despite the lack of pruning and treatment for scale pests, showing that even the comparatively poor gravelly country when it has a good natural drainage is capable of growing good citrus fruit, provided that the trees are given reasonable care, attention, and manuring when required.

There is any quantity of similar land near Gympie, which, though by no means the best in the district, is yet capable of being turned to a profitable use by being planted to fruit. I did not go further up Deep Creek during my last visit to Gympie but some two years previously I followed the creek up, nearly to its source on Mothar Mountain. All along the creek there are pockets of alluvial land that grow good corn, pumpkins, lucerne, potatoes (both sweet and English), vegetables of all kinds and grasses such as prairie, paspalum, Rhodes, and giant couch. The country lying back from the creek is mostly forest of a rolling or ridgy nature, much of which is only fit for grazing and timber, but there are patches of free loamy forest that will grow good citrus fruits. The grazing country is capable of being considerably improved as the planting of introduced grasses and the clearing up of undergrowth will greatly improve its stock-carrying capacity and tend to increase the output of cream.

Leaving Mr. Dundas's I continued my journey in a north-easterly direction, crossing the goldfield and timber reserves till the range bounding the goldfield on the east was reached.

The country passed through is more or less broken, but is well watered by a number of small creeks on the banks of which there are patches of good farming and dairying land, and the ridges though poor produce excellent hardwood timber, the best of which has been cut out, but there are still many fine saplings which if allowed to mature will become excellent timber in time.

The road to Goomboorian was struck where it commences to climb the range and was followed through heavily timbered and more or less broken country, some of it scrub, till Ross Creek, one of the tributaries of Upper Tinana Creek was reached. The land on the eastern slope of the range that drains into the Upper Tinana and Ross Creeks, though much of it is broken, is much richer than that on the western slopes, and from inquiries that I made I am given to understand that some of the land is equal to that in the slopes of the Goomboorian Mountains which I inspected. If this is so, there is land suitable for the growth of bananas, papaws, pineapples, &c., as well as of all kinds of introduced grasses suitable for dairying.

On reaching Ross Creek, the valley of the Tinana was followed down, the land near the creek being more or less level, and gradually rising to the Goomboorian Mountains. Rising from the creek to the mountains there are some fine patches of forest country that in my opinion will produce the finest of citrus fruits. The land is deep, free, well-drained loam, of a reddish or chocolate colour, and has some fine apple trees (Angophora sp.), bloodwoods, blue gums, and forest oak growing on it. The soil resembles that of the noted Melrose Orchard, near Maryborough, but is somewhat freer and should grow equally as good fruit. The Goomboorian Mountains and their slopes are mostly covered by scrub, but there are patches of rich forest as well. South Goomboorian has land equal to the best in the State; and when the elevation is high enough to be out of danger of frost, the soil, which is a rich loam of a dark-chocolate colour, will grow sugar and Lady's Finger bananas, pineapples, papaws, citrus and other fruits to perfection. At Mr. W. Ross's I saw a few sugar banana plants which I have not seen surpassed in any part of the State. Although grown in a dense mass and practically uncultivated, I have never seen healthier or stronger plants of this variety. The fruit was of large size, good flavour, and, despite the strong growth of the suckers, free from the hard lumps that are so common when the plants make a vigorous growth. Mr. Ross is not a fruit-grower, but a dairyman, and, consequently, he is clearing the scrub and planting the ground to paspalum and Rhodes grass. This, in my opinion, is a pity, as land that will produce sugar bananas to such perfection is certainly too valuable to lay down to grass; at any rate till such time as it has had its virgin richness depleted by growing bananas for several years. The bad roads and distance from a market are certainly great drawbacks to the growing of fruit in this part of the district, particularly such a bulky crop to handle as bananas, but against that there is the other consideration, that the area suitable for the cultivation of sugar bananas in Southern Queensland is limited, and that any land capable of growing this fruit to perfection should, therefore, be reserved for this purpose. Following round the eastern slope of the mountain, past the Goomboorian Post Office, I noted the properties of the late Mr. Gillies, where there are some citrus trees growing without any care or attention, and which, despite the fact that they are unpruned, infected with borers, and more or less scaly, yearly produce crops of thin-skinned high-flavoured fruit. I also noted the properties of Messrs. J. Gillies, W. Gillies, and Burns, but did not see that of Mr. Power.

I saw some very fine papaw trees growing on the selection of Mr. J. Gillies, on rich scrub land. They were growing practically wild, as they receive no attention whatever, and are surrounded with a secondary growth of scrub.

The trees were very large for the south of the State, and compared favourably in growth and also in the flavour of the fruit with those grown in the northern coastal scrubs. Oranges, sugar-cane, figs, passion fruit, &c., are being grown by Mr. Burns, and are doing well. I am of the opinion that practically the whole of the eastern and north-eastern slopes of the mountains, where above frost line, will grow good sugar bananas, though some of the land is so steep that it will not be easy to work; still, it is no worse than, if as bad as, the slopes of Mount Cotton, in the Cleveland district, that have grown bananas for many years, or of some of the slopes on the sides of Buderim Mountain that have produced some of the finest Cavendish bananas ever grown in the State. The soil is generally rich, but more or less stony in parts, but this will not be found to be a serious drawback to the growth of the bananas, as some of the best fruit is grown on similar land. Sugar bananas will be the best variety to grow, though Lady's Fingers can be tried in well-sheltered positions, but I would not recommend the planting of the Cavendish variety to any extent, as I am not too certain of its doing well; still, it is worth a trial, as its suitability to the district can only be definitely determined by actual experiment.

Leaving Goomboorian I followed the valley of the Tinana down for some miles, passing through fair grass country; then turned off to the west for Neerdie, where I visited the orchard of Mr. W. G. May. The country here is of a more sandy nature, and there are patches well suited for citrus culture. At Mr. May's there are a number of trees, some of which have a healthy vigorous appearance, and are bearing good fruit. With careful attention and manuring the orchard will be much improved, as the soil is such that it is well adapted for orange growing, and will respond readily to the application of manure. I was told, on good authority, that the fruit grown by Mr. May last season was of exceptional quality, and from what I saw of the trees and soil I have every reason to believe that it was so.

Leaving Mr. May's I continued my journey in a northerly direction, passing through some comparatively poor sandy ridgy country and indifferent forest land, more suitable for grazing than fruit-growing, till Tinana Creek was again reached. On nearing the creek the country improves, and Mr. Cordell's orchard, which is on the bank of the creek, has a free sandy alluvial soil, somewhat similar to the soil in the alluvial pockets along the banks of the Burrum River, but not so rich. Oranges thrive here all right, but in order to obtain the best results from the land generous manuring will be necessary.

This was the farthest point reached down Tinana Creek, as from there I proceeded in a south-westerly direction up Sandy Creek to Anderleigh, passing a small orchard belonging to Mr. Foster, *en route*. The country is all forest, more or less heavily timbered; but much of the higher land is adapted for citrus culture. The trees at Mr. Foster's had an exceptionally good colour, and were making a strong growth, but had no great crop of fruit, though they produced a good crop of fine quality fruit last season.

Some good land for general farming was passed through between Mr. Foster's and Anderleigh, and I noted a few citrus trees grown by Mr. English and Mr. Mulvenie. From Anderleigh I proceeded towards Gunalda, calling at the residence of Mr. Boyce, *en route*, and from thence returned to Gympie. After leaving Mr. Boyce's, where I noted some good citrus land, the road was a very hilly one, and the country passed through is more or less heavily timbered, and of no great value for agriculture, though there are patches of country here and there, which, though broken, have yet fair soil on them. Crossing the Gympie Goldfield the main Northern Railway line was reached and crossed, and the journey to Gympie was continued on the western side of the line through poor and broken country infested by marsupials. This finished the trip, but next morning I proceeded in a south-easterly direction from Gympie towards Woondum, following up Boundary Creek and its branches

in the direction of Mothar Mountain. For some distance after leaving Gympie the country passed through was not of much value, but, adjacent to Boundary Creek and its branches, I noted a number of pockets well adapted for vegetable growing, as well as some ridgy forest country with a free sandy loamy soil that is adapted for fruit culture and grape growing. The bulk of the country is, however, better adapted for grazing than agriculture, still, the pockets already mentioned and the well-drained ridges can be turned to better use than the mere production of grass.

A visit was paid to the homestead of Mr. Riley, which is situated on a sandy rise adjoining one of the creek tributaries. A few old orange and other fruit trees were noted here, and despite the fact that they receive very little attention they produce good fruit. The soil is a deep free sandy loam, well suited to their growth, also to that of such crops as sweet potatoes, English potatoes, peanuts, melons of sorts, grapes, &c.; a soil that is not naturally very rich but one that would respond readily to manuring. The soil adjacent to the creek, which has a splendid supply of water, would make ideal vegetable land, and with the water at hand it would pay well to go in for market gardening, as in a dry time especially there is a fortune to be made out of it. Continuing in the direction of Mothar Mountain, grazing country was met with till Boundary Creek was reached at Mr. J. Hopper's. A good deal of the flat country here is too badly drained for fruit culture, and is better adapted for grazing, but along the banks of the creek itself there are patches of good sound country that are suitable for fruit and vegetables. There is a good permanent supply of water in the creek, and this eventually is bound to be utilised for the growing of farm crops and vegetables. There is a small patch of citrus trees at Mr. Hopper's homestead, growing on a slight rise above the flat country, and having a free soil. The trees have a good dark colour and show a promise for a good crop of fruit. The quality of the fruit produced last year was, I was given to understand, very good. From Mr. Hopper's I returned to Gympie direct, as time would not permit of my going the round *viâ* Upper Deep Creek as I had intended.

The following day I went to Long Flat, off the main Imbil road, to visit the farm and orchard of Mr. Johan Burkhardt, one of the pioneer fruit-growers in the district. Mr. Burkhardt's land was originally partly scrub and partly scrub with hardwood trees running through it—land that grows good corn for the first few years, and then if planted with paspalum, Rhodes, and other grasses makes good dairy country. Mr. Burkhardt has a fair area under sugar bananas on a high scrub ridge from which a fine view of Gympie as well as of all the surrounding country is obtained. Sugar bananas have done well, as the plants keep healthy and the fruit is of good quality. Citrus trees and vines both for table and wine are grown in quantity, and the farm shows what can be done by hard work and perseverance in the Gympie district on land other than that of the alluvial flats of the Mary River.

Continuing up the valley of the Mary River and crossing Imbil Creek some fine farming and dairying land is seen, and only a few miles above Imbil Creek some heavily timbered, rich, chocolate, volcanic, scrub land is met with—land equal in quality to the celebrated fruit and dairy lands of the Blackall Range. This land is suitable for intensive cultivation, and once it is made accessible it is capable of supporting a large number of people.

It is some time since I visited this part of the district, but from what I then saw of the capabilities of the soil for growing corn, pumpkins, potatoes, onions, grass, and fruit, I classed the scrub land as some of the richest in Southern coastal Queensland.

Before leaving the Gympie district, I, in response to an invitation from the Chatsworth Farmers' Progress Association, paid a visit to this part of the district. I was driven out to Mr. W. Allen's, and from there proceeded on foot to examine the newly planted banana gardens belonging to the brothers Allen, situated on the high scrubby ridges lying between the Chatsworth road and

the Mary River. It is a stiff and somewhat rough climb, particularly with a temperature of nearly 100 deg. in the shade, still it was well worth it. The plantations are well above any danger from frost. The soil which varies from stony scrub to a deep free loam, rich in humus, is well suited for the growth of sugar bananas, pineapples, papaws, &c., and the young banana plants were looking remarkably well, and showed every indication of yielding a good return of excellent fruit. I was so pleased with the soil for banana-growing that I have had samples taken and have submitted same to the Agricultural Chemist for analysis. Banana-growing is a new industry here, and given fair average seasons I have no doubt that it will be a profitable one. There is no very large area of suitable land, and much of it is fairly steep, but practically all the scrub land will grow bananas, though the sheltered portions will probably do better than those parts that are exposed to heavy winds, as bananas always do best when sheltered. Any portions of the land too rough or steep for bananas will grow good grass, as prairie, Rhodes and paspalum do well. I noted a patch of sugar-cane doing well, also a quantity of corn. It is probable that the growing of a winter crop of tomatoes will be found profitable, as, owing to the absence of frost, they should do well.

In the afternoon I paid a visit to another patch of high scrub, some three or four miles from the Chatsworth School, on which bananas and pineapples have been grown for some time. On the property belonging to Mr. Greenhalgh, situated on the top of a high ridge, there is a patch of very rich scrub land, planted with bananas which showed a very healthy and vigorous growth, and were carrying a heavy crop of good quality fruit. The bulk of the plants were sugars, but there were a few Lady's Fingers and Cavendish. The Lady's Fingers were doing well, but the Cavendish are not so suitable, as they always do best when grown nearer the ocean, within reach of the sea breeze.

Mr. Willett has a plantation of bananas, pines, and some young citrus fruit trees adjoining Mr. Greenhalgh's. I did not go through the bananas, as time would not permit of my doing so, but seen from a distance they showed a good colour and appeared to be doing well. Young citrus trees are thriving and if given the requisite attention will do well. Pines were somewhat neglected and had been planted too low, so that they had been injured by frost. Like the banana and papaw they must be kept above the frost line.

In the evening I addressed a number of farmers and others interested in the Chatsworth School, and returned to Gympie.

In addition to the districts that I have mentioned in this report, there are several orchards near Gympie that time did not permit of my visiting, notably those of Mr. Flay, of strawberry fame, and Mr. Wright, where grapes, citrus, and other fruits are grown. There are also a number of small orchards on the Chatsworth road, and other parts of the district, some of which are doing well, but others where planted on shallow ground with a heavy subsoil are not a success.

The impressions that I have formed of the capabilities of the Gympie district for fruit-growing may be summarised as follows:—

1st. There are many patches of country in the Goomboorian, Tinana Creek, Sandy Creek, Neerdie, Gunalda, Anderleigh, Deep Creek, Woondum, and Imbil districts that are adapted for the cultivation of citrus fruits. Deep, friable, well-drained soils must be selected, as no soil is suitable for citrus culture that does not possess good natural drainage. Suitable land should be well prepared prior to planting, and once the trees have been planted they should be taken care of. Few investments pay better than a well-kept citrus orchard, especially in a district that can grow high-class fruit; but to stick in trees and trust to providence for the returns is the surest way to court failure.

2nd. The scrubs at Goomboorian, Chatsworth, Imbil, and other parts of the district, when high enough to be out of any danger from frost, are well suited for the growth of sugar bananas, citrus fruits, papaw, passion fruit, granadillas, custard apples, strawberries, Cape gooseberries, &c.

3rd. Free loams or sandy loams throughout the district will grow good grapes, and strawberries will thrive in any well-worked soils of fair quality.

4th. Vegetable culture can be carried out profitably on many pockets adjacent to the numerous creeks, and if gone in for systematically should prove a source of wealth to the district.

In conclusion, I cannot do better than give intending growers the advice that I have given on many previous occasions—viz., that if you want to succeed in fruit or vegetable growing you must look after your orchard or garden thoroughly; you must keep it well worked, pruned, manured, and free from pests of all kinds. Rather plant a small area and give it every attention than plant a larger area and neglect it; it will pay you much better to do so.

Times of Sunrise and Sunset at Brisbane, 1910.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·56	6·46	5·21	6·42	5·41	6·20	5·57	5·47
2	4·57	6·46	5·21	6·42	5·41	6·19	5·58	5·46
3	4·58	6·46	5·22	6·41	5·42	6·18	5·58	5·45
4	4·59	6·46	5·23	6·41	5·42	6·17	5·59	5·43
5	4·59	6·46	5·24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·24	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·39	5·44	6·14	6·0	5·40
8	5·1	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5·3	6·47	5·28	6·37	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·36
12	5·4	6·47	5·29	6·35	5·47	6·9	6·3	5·35
13	5·5	6·47	5·30	6·35	5·47	6·8	6·4	5·34
14	5·6	6·47	5·31	6·34	5·48	6·7	6·4	5·33
15	5·7	6·47	5·31	6·33	5·49	6·6	6·5	5·31
16	5·8	6·47	5·32	6·32	5·49	6·4	6·5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5·29
18	5·9	6·47	5·33	6·30	5·50	6·2	6·6	5·29
19	5·10	6·47	5·34	6·30	5·51	6·1	6·7	5·28
20	5·11	6·47	5·35	6·29	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·13	6·46	5·36	6·27	5·52	5·58	6·8	5·25
23	5·13	6·46	5·37	6·26	5·53	5·57	6·9	5·24
24	5·14	6·45	5·37	6·25	5·53	5·56	6·9	5·23
25	5·15	6·45	5·38	6·24	5·54	5·54	6·10	5·22
26	5·16	6·45	5·39	6·23	5·54	5·53	6·10	5·21
27	5·16	6·44	5·39	6·22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6·21	5·55	5·51	6·11	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6·43	...	...	5·56	5·49	6·12	5·18
31	5·20	6·43	...	...	5·57	5·48	...	...

PHASES OF THE MOON.

			H.	M.	
3 Jan.	☽	Last Quarter	11	27	p.m.
11 ,,	●	New Moon	9	51	,,
18 ,,	☾	First Quarter	8	21	,,
25 ,,	○	Full Moon	9	51	,,
2 Feb.	☽	Last Quarter	9	27	p.m.
10 ,,	●	New Moon	11	13	a.m.
17 ,,	☾	First Quarter	4	33	,,
24 ,,	○	Full Moon	1	36	p.m.
4 Mar.	☽	Last Quarter	5	52	p.m.
11 ,,	●	New Moon	10	12	,,
18 ,,	☾	First Quarter	1	37	,,
26 ,,	○	Full Moon	6	21	a.m.
3 April	☽	Last Quarter	10	48	a.m.
10 ,,	●	New Moon	7	25	,,
17 ,,	☾	First Quarter	0	4	,,
24 ,,	○	Full Moon	11	23	p.m.

Horticulture.

BLUE ROSES.

Professor Gustave Michaud, Costa Rica State College, has an article in the "Scientific American" of 27th November, 1909, on a method of producing blue roses.

The roses, he says, are white with a delicate and beautiful network of blue veins. Such roses can be obtained in little more than one hour by placing the following solution, instead of water, in the vase in which the cut ends of the stalks are dipping:—

Water—100 cubic centilitres (35 oz.).
Aniline methylene blue—2 grammes ($30\frac{4}{5}$ grains Troy).
Potassium nitrate—2 grammes ($30\frac{4}{5}$ grains Troy).

It appears that while some aniline dyes like red scarlet, used for cotton, readily rise into the vessels of the stalk, others, like aniline methyl green, will not, under any circumstances, reach the flowers.

Some common salts were added to the dyes, and one of them, potassium nitrate (saltpetre), was found to exert a powerful influence over the ascent of the dyes, which then rise rapidly and in considerable quantities. The experiment is curious, and should be repeated while using the blue liquid, the end of a few stalks being placed in some of the solution to which no saltpetre is added. Aniline methylene blue is not one of the dyes which readily ascend in plants, and it will be soon noticed that, while the flowers of the stalks dipping into the saltpetre and blue dye solution are covered with the blue network, nothing can still be detected on those whose stalks are allowed to dip in the same liquid without saltpetre.

Will some chemist or botanist suggest an explanation of the influence of saltpetre on the ascent of dyes in stalks and flowers?
Add Agriculture

FAKING BLOOD ORANGES.

The "Presse Médicale" says that blood oranges are often faked in Northern climes, where they command a higher price than the ordinary orange.

In order to transform the latter into blood oranges, certain "manufacturers" inject into the orange, through the rind, with the aid of a syringe provided with a fine needle, a solution of red aniline dye, mixed with a saccharine solution. Now recently, in St. Petersburg, a lady bought from a fruit merchant a dozen of these pseudo blood oranges. She gave one to her daughter, who was at once attacked, on putting the first piece into her mouth, by a sharp pain in the pharynx, and spat blood. A doctor was called in, and he diagnosed the pain and the hæmorrhage as having been caused by a fragment of a needle which had lodged in the mucous membrane. When this fragment was extracted, it proved to be the point of a Pravaz needle, in the eye of which was found a small remaining portion of aniline dye.

On returning to the orange dealer, he revealed that the "dodge" is often resorted to in manufacturing blood oranges.

Tropical Industries.

THE QUEENSLAND SUGAR INDUSTRY IN 1892.

Read in the light of the conditions under which the sugar industry is carried on in Queensland to-day, it is interesting to compare these conditions with those of fifteen years ago.

We lately came across an account of the proceedings at an Agricultural Conference held in Mackay on the 23rd September, 1892. Mr. Mau, president of the Pioneer Farmers' Association, presided, and the Department of Agriculture was represented by Mr. P. McLean, the then Under Secretary, and Professor Shelton, Instructor in Agriculture.

At this conference, a paper was read by Mr. J. E. Davidson, Branscombe, on "The Wage the Sugar Industry in Queensland can afford to give to the Unskilled Labourer." If only to show the great strides the industry has made since that time, and the great amelioration of the position of the unskilled labourer on the plantations, both in wages and domestic comfort, the paper is well worth reproducing, shall we say, as a "Curiosity"?

Mr. Davidson said:—

"The object of this paper is not so much to make an estimate of the probable results of forming and carrying on a sugar plantation of a certain size in Queensland, as it is—by working backwards from the value of the sugar produced, and from what is absolutely known as to the capital required to establish a plantation, the skilled labour necessary, the number of unskilled labourers required, the known cost of their rations, the known cost of supplies—to arrive at what sum is available for distribution amongst the ordinary hands, after allowing a fair interest on the capital employed, and also allowing for wear and tear, accidents, and depreciation.

"It is obvious that certain assumptions must be made to start with, and certain figures fixed, which can all be more or less disputed, as the cost of everything varies with the locality and also with different positions in the same locality.

"I will start with a few comprehensive statements.

"1. The capital required to purchase the necessary land, clear, grub, fence, purchase working stock and agricultural implements, and put up machinery and buildings equal to taking off an annual crop of, say, 2,000 tons of sugar, is £40 per ton, or £80,000, of which one-fourth, or £20,000, will have to be expended on machinery alone.

"2. The labour required to work such an estate, counting all hands, is equal to one man for every five tons, or for a 2,000-ton estate 400 men, of whom 80 would be skilled workmen and 320 unskilled, a proportion of one to four.

"3. Rations cost, on an average of all hands employed, including cooking, fuel, and other requisites, 5s. 6d. per week, or a little over £14 per head per annum.

"4. The expenditure on supplies of all sorts, including wear and tear, amounts to between £4 and £4 10s. per ton, and covers fuel, chemicals, bags, cartage, wharfage, stock, horse-feed, harness, manure, ironmongery, timber, insurance rates, and office outlay.

"5. The value of the sugar produced, assuming the best possible sugar to be made, may be taken at present prices (1892) at £14 per ton all round net to the plantation.

"It will be obvious to most of my hearers; that there must be a good bit of latitude allowed in the matter of supplies, as such items as fuel and carriage of produce will be very different in amount in different parts of this one district, let alone in others; but the broad results I wish to bring before you will not be much affected by these matters, the principle of compensation being largely applicable, as, wherever carriage is long, fuel is cheap, and *vice versâ.*

"Starting with the five premises laid down, I will, following the idea I began with, work backwards from the value of the sugar produced.

	£	£
"This is 2,000 tons, at £14 per ton		28,000
"Against this I have to put four items, which are absolutely known, with a small margin for accidents and unforeseen expenses, viz.:—		
1. Interest on £80,000, at 5 per cent. ...	4,000	
2. Wages of 80 skilled workmen, averaging 25s. per week	5,200	
3. Rations for 400 men, at £14 per annum	5,600	
4. Supplies as per list, at £4 per ton ...	8,000	
Margin for accidents and extra men and rations at busy times	720	
		23,520
		£4,480

"It will thus been seen that, including 5 per cent. interest on the capital (which is very little considering all the risks that are incurred of seasons, of manufacture, and commercial), the absolutely necessary outlay absorbed £23,520, leaving £4,480 available for the unskilled workmen, or £14 per annum, or 5s. 6d. per week each.

"The bare cost of rations to the coloured races is a little less than to white workmen, and comes to about £12 per annum, so that the outside wages, *including everything,* which the sugar industry can at present afford to pay to unskilled labour is £26 per head per annum or 10s. per week.

"When the cost of importation of kanakas ran up to over £30 per head, the annual cost of such labour, including everything, wages, rations, clothing, medical attendance, and passages both ways from and to the islands came to £40 per annum, an amount which the sugar industry at the prevailing price of sugar could not profitably afford to pay, and hence the necessity of closing so many sugar estates throughout Queensland. The result, as worked out in this paper, that £26 per annum, including everything, is the outside value which the sugar industry can profitably give to unskilled labour and survive, should put an end to those crude ideas that sugar can be profitably grown by white labour employed on plantations, for who would dream of offering 5s. 6d. per week and rations? And, further, who would dream of accepting such wages? But there is an opening for white men as employers of coloured labour providing cane for Central Mills. Yet these are the highest wages the industry can afford to give and live, for we must stick to sound commercial principles—*i.e.,* the article produced must, at current market rates, pay the cost of production and the interest on the capital necessary, if it fails to do this, it must die.

"If capital is to be invested in this or any other sugar-growing district, it must be shown that interest can be obtained for the investment, and to show this, the cost of the unskilled labour is a main factor, and that cost, as I have endeavoured to show to-night, cannot, at the present price of sugar, exceed 10s. a week including everything, the sugar industry cannot afford to pay more. This 10s. a week is equal to 1s. 8d. per working day, and it is interest-

ing to compare this with the wages of other sugar-producing countries with which we have at present to compete in the open market, for until we get undiluted separation, we shall not be able to enter into reciprocity arrangements with other Southern colonies, and exchange our sugar free for their flour free.

"In Mauritius the ordinary rates out of which the labourers provide their own rations are 15s. per month, or 6d. per day; in Natal, 8d. per day; in Java and the Philippine Islands, 4d. per day. Fiji gives half our minimum wages—£3 per annum—and their cost of importation is £12, or less than half of ours. It will thus be seen that even 10s. per week, or 1s. 8d. per day is more than double what is at present paid by our actively competing neighbours. We must, therefore, exert all our energies towards cheapening the cost of introduction and return (where the chief expense lies) of our unskilled labour, so that we may be placed more upon a commercial equality with our competitiors."

MILK FROM THE SOYA OR SOJA BEAN.

The Japanese (says an exchange) manufacture considerable quantities of milk from the soya bean, which is said to be very nutritious. The process followed is simple, as the following paragraph shows:—"The beans are first of all softened by soaking, and are then pressed and boiled in water. The resultant liquid is exactly similar to cow's milk in appearance, but is entirely different in composition. The soya bean milk contains 92·5 per cent. of water, 3·02 per cent. albuminoid, 2·13 per cent. fat, 0·03 per cent. fibre, 1·18 per cent. non-nitrogenous substances, and 0·41 per cent. ash. Some sugar and a little phosphate of potassium are added in order to prevent the elimination of albumen, and then the moisture is boiled down till a substance like condensed milk is obtained. This condensed vegetable milk is of a yellowish colour, and has a very pleasant taste hardly to be distinguished from real cow's milk."

GATTON COLLEGE EX-STUDENTS' CLUB.

Mr. E. F. Youngman, acting secretary of the Gatton College Ex-students' Club, writing from the College on 24th January, says:—

Per medium of your Journal we beg to acknowledge receipt of annual subscriptions to Ex-students' Club for this year, 1910:—J. Proud, Korumburra, Victoria, 10s.; Frank Bray, Kynnumboon, Tweed River, 5s.; F. E. Walker, Woolooga, 5s.; R. Baker, Mount Pleasant road, Gympie, 5s.; M. Shield, Brisbane, 5s.; O. P. Hardgrave, Wellington Point, 5s.; P. V. Campbell, Beaudesert, 5s.; A. E. Dyne, Gympie, 5s.; R. H. Bentley, Caboolture, 5s.; A. and T. Clarke, Thornton, 10s.; H. Moran, Ravenswood, 5s.

We have lately received word from three ex-students who only completed their course at the College last year. T. Nuttall has acquired a valuable property at North Pine, an up-to-date going concern, where he has excellent prospects of establishing a very comfortable home.

J. Lamberton has purchased a fine block of country at Yeppoon, near Rockhampton. After certain improvements have been made, he intends stocking with dairy cattle, and engaging in mixed farming.

J. Dinsdale has settled on the Don River, and intends to make fruit-growing his specialty. He has purchased one of the finest orchards in that district.

Animal Pathology.

BILIARY FEVER OR MALIGNANT JAUNDICE OF THE DOG (CANINE PIROPLASMOSIS).*

FURTHER NOTES ON THE DRUG TREATMENT.

By WALTER JOWETT, F.R.C.V.S., D.V.H., Veterinary Department, Cape Town.

The last issue of the "Agricultural Journal" contained a report on certain experiments carried out at Rosebank Experimental Station in connection with a newly introduced treatment for the abovementioned disease.

Judging from the numerous queries which have since been addressed to the writer, it appears that the general method of carrying out the treatment as described in our former article was not made sufficiently clear; it seems desirable, therefore, to recapitulate and to amplify this part of the subject. Since the last report was issued we have treated several other dogs—naturally infected as well as experimental cases. These we are pleased to say, with two exceptions—one far advanced and hopeless from the commencement, the other will be referred to presently—recovered after one injection of Trypan blau in appropriate dosage. We can but repeat the statement contained in the previous article—viz., that the Trypan blau treatment for this disease (canine biliary fever) for the knowledge of which we are indebted to the researches of Prof. Nuttall and Dr. Hadwen has, in our hands, proved an unqualified success. It has in fact more than realised all our expectations.

Most of the questions which have been raised have had reference to one or other of the following points:—

1. The nature, cost, and appearance of Trypan blau.
2. The mode of preparation of solutions used for therapeutic purposes—that is, for injection either into a vein or under the skin; and
3. The general procedure in injecting the dye, the dosage, and the number of doses to be given.

In this short note we will endeavour to briefly answer these questions.

I.—The Nature, Cost, and Appearance of Trypan blau.—Trypan blau is one of the newly introduced Benzidine colours; in appearance it is a dark coloured (violet or black) somewhat coarse powder, soluble—though not to any considerable extent—in both hot and cold water. Its solubility is, naturally, greater in the case of the former as compared with the latter.

Regarding cost we are unable to quote precise figures, but the drug is comparatively inexpensive.

II.—The Mode of Preparing Solutions for Injection.—In our early experiments the proportion of dye to water used was 3 per cent. This was prepared with boiling distilled water and injected at blood heat. We did not filter the solution, and in the process of cooling a considerable quantity of the dye separated out, forming a sediment. Consequently when drawing up the liquid into the syringe for injection purposes, we took up also some of the sediment. This, we decided later, was undesirable. Much of the intense local reaction which followed the injection of the unfiltered liquid under the skin we attributed to the presence of this undissolved dye or sediment therein. Moreover, it was found that a 2 per cent. solution

* From the "Agricultural Journal of the Cape of Good Hope," November, 1909.

answered all requirements, and now this is the strongest solution we use. In the proportion of 2 per cent. Trypan blau dissolves in boiling water, but a certain proportion separates out on cooling. This can be removed by filtration. The filtered fluid, we consider, gives much more satisfactory results; true, when introduced under the skin in large quantities it produces some local reaction in the nature of a swelling. This, however, is not nearly so large or so troublesome as that following the injection of an *unfiltered* 2 per cent. or stronger preparation. For small animals and puppies a 1 per cent. solution is still used as heretofore. This we do not filter. For intravenous injection we now use likewise a 2 per cent. solution *after filtration.*

In preparing say one hundred cubic centimetres of Trypan blau solution for injection—we proceed as follows:—

1.—First we weigh out 2 grammes of the powder Trypan blau, and place this in a perfectly clean vessel (glass beaker).

2.—Next we add to the powder one hundred cubic centimetres of boiling distilled water (about 9 grains to the fluid ounce would form a 2 per cent. solution).

3.—After cooling, this is filtered through a funnel containing a filter paper suitably folded, the filtrate being received into a glass measure or beaker. This furnishes the material for injection.

All our apparatus is boiled (to sterilise it) prior to use, or the filtrate is afterwards brought to the boiling point and allowed to cool again before being injected.

III.—The general procedure in injecting the dye is as follows:—

One uses, of course, a suitable hypodermic needle and syringe, and these, prior to being used, are placed in a pan containing cold water, which is placed on a stove, and both syringe and needle are boiled for ten minutes or so in order to sterilise them. After cooling the approximate quantity of a solution of Trypan blau is drawn up into the syringe, and the needle, either separately or attached to the syringe, is introduced under the patient's skin, or directly into a vein, as the case may be. By pressing gently on the piston of the syringe the dose is introduced. After withdrawing the needle and syringe the operation is completed.

Regarding the *Site of Injection*, when introducing the solution merely under the skin, one usually injects it in the chest wall, behind the shoulder, or on the under surface of the abdomen (belly). A fold of skin is pinched up with the left hand, and the needle introduced with the right. One usually clips a small patch of hair from the selected site and washes the area with a disinfectant prior to introducing the needle.

The operation then is simple. Nevertheless, it requires a certain amount of skill and care, and wherever the services of a duly qualified veterinary surgeon are available, it would be unwise for the layman to undertake the treatment. In many parts of the Colony, of course, it is impossible for one to obtain the services of a veterinary surgeon, and it is for the benefit of persons living in such districts that the above brief instructions have been written. We repeat that the necessity of this course has been made manifest by the numerous queries which have been addressed to us during the past few weeks.

In regard to dosage, the following are approximately the doses we have administered.

Puppies of two months old and of 3 to 5 lb. weight received 3 to 4 cc. of a 1 per cent. solution.

An adult nondescript (9 lb.) received 3 to 5 cc. of a saturated solution.

Terriers of from 11 to 20 lb. received from 4 to 6 cc. of a saturated solution.

Dogs of from 20 to 30 lb., 6 to 10 cc. of a saturated solution.

Dogs of from 30 to 40 lb., 10 to 15 cc. of a saturated solution.

Two dogs, one a retriever, the other a sheep dog, each weighing 59 lb., each received 20 cc. of a saturated solution.

A Newfoundland of 65 lb. weight received 25 cc. of a saturated solution.

Regarding the Number of Doses to be Administered.—One full dose should suffice. This will cause the parasites to disappear from the blood True they may reappear therein some days afterwards in sufficiently large numbers to be demonstrable on microscopical examination, but in most instances the second invasion seems to occasion no visible ill effect to the host; certainly the body temperature may be elevated in consequence of it, but as a rule the animal remains to all appearance in good health and continues on the road to recovery.

Occasionally, however, the reappearance of the parasites in the blood in considerable numbers brings about a relapse, and, as Nuttall and Hadwen have already remarked, "When a relapse occurs in a dog which has been previously treated, a second dose of Trypan blau seems to exert no influence on the parasites."

One of our patients in which a relapse occurred twelve days after treatment fully bears out this statement—this is one of the two animals referred to in the first part of the present note. In this case, although the first dose of Trypan blau caused the parasites to disappear from the blood, they reappeared therein after some days, producing a serious relapse in the animal's condition. A second dose now administered (twelve days after the first), although intensifying the blue colouration of the tissues, yet seemed to exert but slight, if any, action on the parasites, which remained in quite considerable numbers in the blood. Later, however, they became less numerous, and at the time of writing the animal appears to be progressing slowly towards recovery.

One must administer, then, a full dose of the drug at the commencement of the treatment. This, combined with suitable dieting and nursing, will suffice in the majority of cases to effect a speedy and satisfactory cure.

PRICE OF RAW SILK.

Messrs. Durant, Bevan, and Co., London, have furnished the Queensland Agent-General with the following information concerning the current prices of silk in January, 1910:—"It is impossible to give any idea of the value of Queensland silk without seeing it, as the article may vary from about 2s. 6d. to 17s. or 18s. per lb."

Messrs. Eaton and Co., London, write:—Price of China silk, 8s. 6d. per lb.; Italian, raw, about 18s. per lb.

The "Economist" in its market report gives the following prices:—Bengal, per lb., 10s. to 10s. 3d.; Tussah, 3s. 9d. to 4s.; Italian, 18s. 3d. to 18s. 9d.; China, 8s. 6d. to 13s. 9d.; Japan, 14s. 6d. to 16s. 6d.

Silk should be packed in bales of about 150 lb., nett, a cotton sheeting next the silk, then oil-paper, and then a hessian covering.

Vegetable Pathology.

POTATOES—INSPECTION AND TREATMENT.

By H. TRYON, Vegetable Path logist.

With the arrival of the season for potato planting, it is expedient to point out that there are certain diseases and injurious insects incidental to this plant that may be imported into the crop through the use of defective tubers for seed purposes—a possible occurrence that the adoption of certain precautionary measures may serve to prevent.

Amongst these injurious agents may be mentioned—

1. The Mining Caterpillar or "Potato Worm," the young of a small moth *(Gelechia solanella)*.
2. "Black Heart" and "Brown Fleck" affections.
3. Nematode, or Root Gall Disease.
4. Black Shank (Rhizoctonia).
5. Potato Scab.
6. Brown Rot, or "Bacteriosis."
7. Fusarium Disease.
8. Phytophthora Potato Disease, Blight, or Red Rust.
9. Black Scab or Black Wart (*Chrysophlyctis endobiotica*).

GENERAL.

As general measures it is advised that (1) the "seed" intended for planting be cut in order to ascertain its soundness or the reverse, and (2) that it be steeped in a bath in which formalin, Bordeaux mixture, or corrosive sublimate enters as an ingredient, in order that fungus spores not discernible on inspection may be destroyed. If, however, it be found to be disease-affected either before or on cutting the tubers into sets, its rejection should be considered imperative. Again, potatoes intended for planting should not be drawn from any district in which the Blight is known to have been established—a very important consideration, especially for the Queensland grower.

The different potato ailments are distinguished by special features, and a recognition of these will alone render inspection serviceable. Further, such examinations must include the scrutiny of both external and internal portions of the tubers.

SUPERFICIAL INSPECTION.

In examining the exterior surface of the tuber, sunken areas of decay, with or without puckering of the skin, may denote Potato Blight *(Phytophthora infestans)*, or Brown Rot (bacterial disease). In seed potatoes this should be sound and intact, since mere mechanical injuries serve, or have served, for the admission of bacteria and fungus spores that may cause the sets to decay prior to proper vegetative growth having developed.

The surface also should be even, and of more or less uniform colour. Blackish cloud-like patches may denote the presence of Blight (Phytophthora) temporarily arrested in its progress; raised black excrescences (seen on wetting the tuber), coupled with a finely-cracked skin, are an indication of the presence of the Rhizoctonia fungus, that may originate Black Shank disease in the growing plants.

If the surface be at all pimply or tuberculated, we have one of the features presented by the Nematode Disease or Gall Worm, that—on account of its liability to attack many staple crops—should be excluded from farm lands at any cost; and, it may be pointed out, seed potatoes and the peel of potatoes that have been used for culinary purposes are a common source whence land is more or less permanently endowed with the root-parasites originating this malady.

Again, no scab-like blemishes should be present, as these denote generally the presence of Potato Scab, which again may become, on being once introduced, a permanent endowment of potato soils.

The "eyes" of the tuber should also claim attention. If these be not sprouted, but are filled with soil, and this is compact, sticks fast, and appears in fact to have been glued in position, we have indication of Brown Rot or Potato Bacteriosis in a latent condition—a disease that will soon assert its presence, and become more or less permanent in the potato area when once introduced by the agency of tubers thus affected. Coral or brain-like dark-coloured tumours or warts at one or more points, especially at the crown end, and that originated in a malformation of the buds (eyes), are an indication that the malady caused by *Chrysophlyctis endobiotica* is present. Should, again, they be occupied by small dark-brown or lighter-hued particles that observation indicates is not soil, the presence of "Potato Worm" *(Gelechia solanella)* is denoted, and the use of the knife point will reveal its tunnelling in confirmation of this. Obviously "worm"-eaten tubers should, of course, be at once excluded. Failing attention to this requirement, an insect may, as has often happened, be introduced on to a farm, highly destructive both to the potato and the tobacco; and, as regards the former plant, a most harmful one as regards haulms, foliage, and stored product alike.

Of course, there are other surface features that potatoes intended for seed purposes should exhibit when regarded from the purely agricultural standpoint. These are not, however, our concern.

INTERNAL INSPECTION.

The examination of potatoes intended for planting, to serve its full purpose, must be supplemented by an inspection of its interior substance or tissues. Planting cut tubers only will afford an opportunity for such inspection, but the purchase of seed should also be regulated by the results of this closer scrutiny.

In making this inspection, the condition of the following portions of the tuber should be passed in review—viz., (1) the skin or peel, (2) the substance or "flesh" immediately beneath this, (3) the "ring"—a light colour linear marking running almost parallel to the surface at a short distance from it, with loops joining the eyes where these are situated, (4) the general substance of the tuber—especially internal to this ring, (5) the central area or "heart." These portions, of course, can only be properly brought into view by severing the tuber with a knife or similar cutting instrument.

1. *The Skin or Peel.*—In the properly ripened potato the skin or jacket is usually unbroken, and not readily detachable. If, however, the tubers have not been properly cared for, mechanical injury may result in the opposite condition to some extent. Should, however, the peel be already detached or be capable of being readily rubbed off, and the potato substance immediately beneath be brownish hued, and more or less translucent and rust-speckled, one of the symptoms of Potato Blight *(Phytophthora disease)* is present.

2. *Substance internal to Peel.*—(*a*) If, on cutting the tuber, there be a brown or blackish-brown discolouration adjoining the skin, and passing to a

varying extent inwards—with or without the speckling above referred to—the presence of Blight is again indicated. Mere scraping with a knife will indicate this less developed manifestation of it. Its further use will reveal a further and more extensive discolouration of tissue, and the breaking down of this when the disease is more pronounced. (*b*) Should little pin-head clear spots with more opaque centres be detected, the presence of Nematode disease may be suspected, especially should this symptom accompany surface pimpling.

3. *The "Ring."*—On cutting the tuber directly across, the fine line constituting the "ring" should not exhibit any pronounced discolouration, unless, in parts, more or less purple-hued when the tubers present this colour externally, as in, for example, the Circular Head variety. (*a*) If it be brown, especially near the stem end of the tuber, we have one of the symptoms of Fusarium disease. (*b*) If it be brown also, and minute droplets of glistening gum come into view along its course, when the sap coming from the cut surface of the tuber has dried off, Brown Rot or Bacteriosis is indicated, and the use of seed thus conditioned will be almost certain to give rise to a disease-affected crop. As a more pronounced symptom of this malady, brown discolouration and decay will be found to have proceeded from the "ring" both outwards and inwards. In the tuber reserved under dry conditions for seed, Potato Bacteriosis may remain for a long period in the latent condition of development, developing with virulence when it is once planted.

The Sour Rot, exclusively originating in mechanical injury, will do so also, but in its case we have not to deal with a disease affecting the growing plant.

4. *General Substance of Tuber and "Heart."*—Apart from the discolouration, decay, and breaking down of tissue which may be the outcome of "Potato Blight," "Potato Bacteriosis," and "Potato Rot" of various origin, there occur certain non-parasitical diseases that originate in the disturbed functional activities of the plant, and that appear to be perpetuated by the use of faulty seed. If, on cutting the tuber through, the "flesh" appears unusually "watery" and yellow-hued, and there are isolated brown patches that become more pronounced as it is longer exposed, we have a symptom of Brown Fleck disease whose presence interferes with the marketable value of the crop. Sometimes, again, the tuber has its "heart" dark-coloured; in fact, nearly black, and manifesting the condition know as "Black Heart." Potatoes exhibiting this symptom should be avoided also when selecting "seed." Hollow-centred tubers should be similarly dealt with. And, generally speaking, the seed should be sound, well formed, of good colour, starchy, and weigh well, as indicating this.

It must, in conclusion, be pointed out that it is obligatory on the part of the potato-grower to preserve his seed potatoes from injury and disease when once he has acquired them. A few "wormy" potatoes will soon breed moths in sufficient numbers to infect several cwt. of these. It is, therefore, desirable to protect them from access on the part of these destructive insects. Dry blady grass, if used in sufficient quantity around the tubers on all sides, will largely effect this result, especially if Naphthaline (Moth Balls), Vaporite-Strawsons, or Apterite—two substances largely composed of this—be distributed throughout the bulk. Again, the sound seed potatoes must not be planted on land that has yielded a disease-affected crop previously, especially during the past season—this remark being specially applicable with respect to Gall-worm Disease, Scab Disease, Black Shank Disease, and Phytophthora Disease, or Blight.

Potato-planting will shortly have to be succeeded by potato spraying as an ordinary field operation, in view of the possible occurrence of Potato Blight (*Phytophthora infestans*), Black Spot (*Macrosporium solani*), and the various leaf-eating insects. Moreover, a commencement will need to be made with

this procedure when the "tops" are 6 in. high, and continued as elsewhere directed. Moreover, it must be borne in mind that the treatment alluded to is a preventive one, and, therefore, must be carried out, if good results are to be anticipated from it, prior to the manifestation of disease or insect attack against whose occurrence it is directed.

Growers, therefore, should provide themselves with spraying appliances where necessary, as well as with the ingredients for compounding sprays, and those who are fortunate in possessing these former already should overhaul them and see that they are in good working order. Appended will be found particulars for compounding steeping fluids wherein to dip the tubers intended for seed purposes.

DISINFECTION OF SEED POTATOES.

Formalin.

1. As a safeguard against the introduction of disease through the use of seed potatoes that are not visibly affected, but which may be suspected to outwardly harbour disease-producing spores or germs, the following treatment is recommended:—Wash the tubers, if very dirty. Then immerse them for $1\frac{1}{2}$ to 2 hours (if not sprouted, the time may be safely extended) in a mixture of formalin (40 per cent.) and water containing 1 pint (or about 1 lb.) of the former to 24 gallons (6 kerosene tinfulls) of the latter. This mixture should be freshly prepared, since the active principle on which its efficacy is dependent is a volatile one. As long as it possesses its characteristic odour, it is an efficient mixture, but, of course, rapidly deteriorates through use. It is convenient, in carrying out this process, to suspend the tubers in the disinfecting fluid contained in a gunny bag, or a similar receptacle made of some open fabric. After removal, they should be spread out to dry, and then cut and planted without delay.

Corrosive Sublimate.

2. If Potato Scab be present on the "seed," and it is not convenient to substitute clean tubers, a healthy crop may be grown from this scab-affected "seed," providing that the ground intended for planting is not already contaminated, by treating it with a solution of Corrosive Sublimate. This should be prepared by dissolving $2\frac{1}{4}$ oz. of the chemical named in about 2 gallons of hot water, and after an interval of 10 or 12 hours diluting with 12 gallons of water. The potatoes to be planted are simply immersed in the solution for an hour and a-half, then spread out to dry, and planted in the usual manner. A large barrel offers a convenient receptacle for the solution, and metal ones should not be used since they are liable to be corroded by it. It must, however, be borne in mind that Corrosive Sublimate is extremely poisonous to animal life, and must, therefore, be used with the greatest care. Both it and its solution must be kept out of the way of children, and conspicuously labelled. Special receptacles should be employed for the treatment, and for it only. *And all tubers treated as described should be planted.* Only, therefore, under exceptional circumstances should the formalin steeping fluid be replaced by this one.

After the potatoes have been planted and thus growth ensued, the crop must be sprayed with Bordeaux mixture or other efficacious fungicide as a preventive treatment against the occurrence of Blight (*Phytophthora infestans*) or Leaf Spot (*Macrosporium solani*), arsenate of lead or arsenite of soda being incorporated with the fungicidal mixture to protect the foliage from insect attacks. Arsenite of soda (Kedzie formula) may be substituted for the arsenate of lead.

In the case of the "Summer Crop," early planting is recommended, and for the "Winter Crop" the reverse—advice that has reference exclusively to the seasonal appearance of the "Potato Blight" under the climatic conditions of Southern Queensland.

General Notes.

WINE-MAKING.

Twenty-four hours before the vintage, choose a quantity of the soundest and ripest grapes, sufficient to make 30 gallons of juice. Crush them in a clean hogshead with the head out, and cover with a clean linen cloth. Fermentation will have started before you begin your vintage. Then, as you crush your main crop, sprinkle this juice (or yeast, as it is called) over the fresh grapes. This will start a healthy fermentation.

Before crushing the main crop, pick off all unsound and unripe grapes, and wash the bunches to remove bacteria. Run the juice from the crushing mill into a vat below it. A vat should not be larger than one with a capacity of 500 gallons. If fermenting is done on the skins, the vat must not be filled more than about 8 in. from the top. When all colour has been extracted from the skins, the juice should be racked off to finish its fermentation in the cask. White wine is made without fermenting on the husks.

When the fermentation is complete, rack the juice off into clean casks. Do this as soon as the wine has cleared. The casks should be well sulphured just before racking off. The sulphuring is best done by putting sulphur into a shallow iron cup and lighting the sulphur before lowering into the cask. The next thing is to keep the casks well filled up with sound wine of the same quality. In the spring a second racking should be given. For the production of claret, the stalks must be removed before crushing. The temperature during fermenting is from 80 to 90 degrees. When all fermentation has ceased and the wine is perfectly clear it may be racked off and bottled, or else racked off into a clean cask. Our own experience of making wine may be here given, especially as the wine we made took first prize at one of the Brisbane shows many years ago. The grapes were removed from the stalks. All damaged and unripe ones were rejected. They were crushed by hand into a wooden tub, and juice and husks were placed in a cask with the head off to ferment. In a few days the clear juice was racked off into a clean cask to undergo a second fermentation. When this ceased, and the wine was perfectly clear, it was bottled, and proved to be a first-class white wine. Be careful never to ferment in a zinc tub. We once did this, with disastrous results.

Answers to Correspondents.

TO GET RID OF RED ANTS.

H. R. DEBNEY, Normanton—

Try the following remedy:—Mix flour, sugar, and arsenic to the consistency of putty with water, and place pieces of the mixture about the nests of the ants. If an examination is made a few days after using this remedy, hundreds of dead ants will be found in the vicinity of the poison, and it is very unlikely that the ants will reappear on a spot where the mixture has been used.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	DECEMBER. Prices.
Apples (Eating), per case	3s to 7s.
Apples (Cooking), per case	3s. 6d. to 5s. 6d.
Bananas (Cavendish), per dozen	$\frac{3}{4}$d. to $1\frac{3}{4}$d.
Bananas (Sugar), per dozen	$1\frac{3}{4}$d. to 2d.
Cherries, per quarter-case	...
Grapes, per lb.	2d. to $2\frac{1}{2}$d.
Grapes (Hamburg), per lb.	...
Lemons (Italian), per large case	17s. to 18s.
Lemons (Lisbon), local, per case	2s. 3d to 2s. 4d.
Mangoes, per case	1s. 6d. to 2s.
Nectarines, per quarter-case	1s. to 2s.
Oranges (Italian), per large case	18s. to 20s.
Oranges (local), per case	2s. 6d. to 5s.
Papaw Apples, per quarter-case	1s. to 2s.
Passion Fruit, per quarter-case	1s. to 1s. 6d.
Peaches, per quarter-case	3s. to 4s.
Pears, per case	6s. to 8s.
Pineapples (Ripley Queen), per dozen	6d. to 1s. 7d.
Pineapples (Smooth), per dozen	1s. to 2s.
Pineapples (Rough), per dozen	...
Plums, per quarter-case	1s. 5d. to 4s. 6d.
Quinces, per case	3s. to 5s.
Rock melons, per dozen	1s. to 2s.
Tomatoes, per quarter-case	9d. to 1s. 6d.
Water melons, per dozen	2s. to 4s.

SOUTHERN FRUIT MARKET.

Article.	Prices.
Apples (Local), choice, per case	12s. to 15s.
Apples (Nelson's), per case	...
Apples (Cooking), per case	6s. to 7s.
Apricots, per quarter-case	2s. 6d. to 3s.
Bananas (Queensland), per case	7s. to 7s. 6d.
Bananas (Queensland), per bunch	1s. 6d. to 2s. 6d.
Bananas (Fiji), per case	12s. to 15s.
Bananas (Fiji), per bunch	3s. 6d. to 7s. 6d.
Cherries, per quarter-case	...
Cocoanuts, per dozen	1s. 9d. to 2s. 6d.
Gooseberries, per half-bushel case	...
Grapes (Local, Black), per 12 lb. box	7s. 6d.
Lemons (Italian), per half-case	10s. to 11s.
Lemons (Local), per gin case	5s. to 8s.
Nectarines, per half-case	2s. 6d. to 4s.
Oranges (Local), per case	9s. to 16s.
Oranges (Italian), per 100	13s. to 14s.
Passion Fruit (Choice), per half-case	3s. to 3s. 6d.
Peaches, per half-case	2s. 6d. to 3s. 6d.
Pears (Choice), per gin case	7s. to 7s. 6d.
Peanuts, per lb.	$5\frac{1}{2}$d.
Pineapples (Queensland), Ripley, per case	4s. to 5s.
Pineapples (Queensland), Common, per case	4s. to 5s.
Pineapples (Queensland), Queen's, per case	5s. to 6s.
Plums, per half-case	2s. 6d. to 3s. 6d.
Rock melons (Queensland), per double case	4s. to 6s.
Tomatoes, per half-case	3s. to 4s.
Water melons (Queensland), large, per dozen	5s. to 7s.
Water melons (Queensland), medium, per dozen	3s. to 4s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR FEBRUARY.

Article.		FEBRUARY. Prices.
Bacon, Pineapple	lb.	2¼d. to 10½d.
Barley, Malting	bush.	3s. to 3s. 6d.
Bran	ton	£4 2s. 6d.
Butter, Factory	cwt.	99s. to 101s.
Chaff, Mixed	ton	£3 10s. to £4 10s.
Chaff, Oaten	„	£5 to £5 5s.
Chaff, Lucerne	„	£2 10s. to £4.
Chaff, Wheaten	„	£2 to £2 5s.
Cheese	lb.	5d. to 9d.
Flour	ton	£10 15s. to £11.
Hay, Oaten	„	£5 15s.
Hay, Lucerne	„	£2 to £2 10s.
Honey	lb.	2¼d. to 2½d.
Maize	bush.	3s. 6d.
Oats	„	3s. to 3s. 8d.
Pollard	ton	£4 7s. 6d.
Potatoes	„	£2 10s. to £9 10s.
Potatoes, Sweet	cwt.	2s. 6d.
Pumpkins	„	4s. 2d.
Wheat, Milling	bush.	2s. 1d. to 4s. 6d.
Wheat, Chick	„	...
Onions	ton	£7 15s.
Hams	lb.	11½d. to 1s. 1½d.
Eggs	doz.	10½d. to 1s. 4½d.
Fowls	pair	2s. 9d. to 4s.
Geese	„	3s. to 4s. 6d.
Ducks, English	„	3s. 9d. to 5s.
Ducks, Muscovy	„	6s. to 7s. 6d.
Turkeys (Hens)	„	...
Turkeys (Gobblers)	„	...

ENOGGERA SALEYARDS.

Animal.	JANUARY. Prices.
Bullocks	£7 17s. 6d. to £9 12s. 6d.
Cows	5 17s. 6d. to £7 10s.
Merino Wethers	15s.
Crossbred Wethers	16s. 6d.
Merino Ewes	16s. 3d.
Crossbred Ewes	12s. 3d.
Lambs	12s. 3d.

Orchard Notes for April.

By ALBERT H. BENSON, M.R.A.C.

THE SOUTHERN COAST DISTRICTS.

The gathering and marketing of citrus fruit, as well as of pines, bananas, custard apples, persimmons, &c., is the principal work of the month. In the Notes for March I drew attention to the necessity for keeping all pests in check, particularly those attacking the ripening fruit. As it is the height of folly to look after the orchard thoroughly during the growing period of the crop and then to neglect the crop when grown, every possible care must be taken to keep fruit fly, peach moth, black brand, or other pests that destroy or disfigure the fruit in check, and this can only be accomplished by combined and systematic action. Citrus fruit at this time of the year often carries badly, as the stem is tender, easily bruised, full of moisture, and, consequently, very liable to the attack of the blue mould fungus, which causes specking. The loss from this cause can be lessened to a considerable extent by carefully attending to the following particulars:—

1st. Never allow mouldy fruit to hang on the trees or to lie about on the ground. It should be gathered and destroyed, so that the countless spores which are produced by the fungus shall not be distributed broadcast throughout the orchard, infesting every fruit, and only waiting for a favourable opportunity, such as an injury to the skin by an insect or otherwise, combined with favourable weather conditions (heat and moisture), to start into growth.

2nd. Handle the fruit carefully to prevent bruising. Cut the fruit, don't pull it, as pulling is apt to plug the fruit—that is to say, to either pull the stem out or injure the skin round the stem—and a fruit so injured will go mouldy.

3rd. Sweat or dry the fruit thoroughly; if the weather is humid, laying the fruit out in the sun on boards or slabs is a very good plan.

4th. After sweating, examine the fruit carefully, and cull out all bruised or punctured fruit, and only pack perfectly sound dry fruit. It is better for the loss to take place in the orchard than for the loss to take place in the case in transit.

5th. If the mould is very bad, try dipping the fruit for a few seconds in a 2 per cent. solution of formalin. This will kill the spores, and if the fruit is placed in the sun and dried quickly before packing there will not be much chance of its becoming reinfested.

Don't gather the fruit too green, especially such varieties as the Beauty of Glen Retreat Mandarins, as immature fruits spoils the sale of the good article.

If the orchard has not been cleaned up after the summer rains, do so now; and do any other odd jobs that may be required, such as mending fences, grubbing out dead or worthless trees, cleaning out drains, &c.

Strawberry planting may be continued, and where new orchards are to be planted continue to work the soil so as to get it into the best possible tilth.

TROPICAL COAST DISTRICTS.

Clean up the orchards after the rainy season. Look out for scale insects, and cyanide or spray for same when necessary.

Go over the trees carefully, and when there is dead wood or water sprouts remove them. If bark fungus is showing, paint the affected branches with the

sulphur and lime wash. Clean up bananas, pineapples, and other fruits, as after the end of the month it is probable that there will not be any great rainfall, so that it is advisable to keep the ground well cultivated and free from weeds, so as to retain in the soil the moisture required for the trees' use during the winter months. Keep bananas netted; destroy guavas wherever found.

SOUTHERN AND CENTRAL TABLELANDS.

If the orchards and vineyards have not already been cleaned up, do so. Cultivate or plough the orchard, so as to get the surface soil into good tilth, so that it can absorb and retain any rain that falls, as, even though the trees will simply be hardening off their summer's growth of wood, it is not advisable to let the ground dry out. When citrus fruits are grown, attend to them in the manner recommended for the Southern Coast Districts; and when grown in the dry parts, keep the land in a state of good cultivation. Should the trees require it, a light watering may be given. Do not irrigate vines; let them ripen off their wood.

Farm and Garden Notes for April.

FIELD.—The wheat land should now be ready for sowing the early wheats, and that which has not been prepared should be ploughed without delay, April, May, and June at latest being the months for sowing. The main potato crop planted in February and March, will now be ready for a first or second hilling up. The last of the maize crop will have been got in. Where cotton is grown, the pods will be opening, and advantage should be taken of dry weather to get on with the picking as quickly as possible. Picking should not be begun until the night dew has evaporated nor during rain. Sorghum seed will be ripe. Tobacco also will be ripening, and either the leaves or the whole plant may be harvested. Lucerne may be sown, as the growth of weeds has now slacked off, but the ground must be thoroughly prepared and cleaned. Sow oats, barley, rye, wheat, mangolds, and Swede turnips. Plant out paspalum roots. Seed wheat of whatever variety sown should be dipped in a solution of sulphate of copper (bluestone) in the proportion of 1 lb. of sulphate to 24 gallons of water. The seed may also be treated with hot water by plunging it in a bag into hot water at 120 degrees Fahr. for a minute or two, and then into water heated to 135 degrees Fahr. Allow it to remain in this for ten minutes, moving it about all the time. Then plunge the seed into cold water and spread out to dry. This plan is useful in districts where bluestone may not be obtainable. Another safeguard against bunt, smut, black and red rust is to treat the seed with formalin at the rate of 1 lb. of formalin to 40 gallons of water. Schering's formalin costs about 2s. 10d. per lb., and is sold in bottles. It is colourless and poisonous, and should be kept where no children or persons ignorant of its nature can have a chance of obtaining it. To treat the seed, spread it on a wooden floor and sprinkle the solution over it, turning the grain over and over until the whole is thoroughly wetted. Then spread it out to dry, when it will be ready for sowing. Instead of sprinkling, dipping may be resorted to. A bushel or so of seed is placed in a bag and dipped in the solution. During five minutes the bag is plunged in and out, and then the seed is turned out to dry. Formalin is less injurious to the grain than bluestone, but, while the latter can be used over and over again, formalin becomes exhausted. It therefore follows that only the amount required for immediate use for sprinkling should be prepared. Do not sow wheat too thickly. Half a

bushel to the acre is sufficient—more on poor land and less on rich soils. On light sandy soil the wheat should be rolled. On sticky land it should only be rolled when the land is dry, otherwise it will cake, and must be harrowed again after rolling. When the wheat is 6 in. high go over it with light harrows. If the autumn and winter should prove mild and the wheat should lodge, it should be kept in check by feeding it off with sheep.

KITCHEN GARDEN.—Hoe continually among the crops to keep them clean, and have beds well dug and manured, as recommended last month, for transplanting the various vegetables now coming on. Thin out all crops which are overcrowded. Divide and plant out pot-herbs, giving a little water if required till established. Sow broad beans, peas, onions, radish, mustard and cress, and all vegetable seeds generally except cucumbers. Early celery should be earthed up in dry weather, taking care that no soil gets between the leaves. Transplant cauliflowers and cabbages, and keep on hand a supply of tobacco waste, preferably in the form of powder. A ring of this round the plants will effectually keep off slugs.

FLOWER GARDEN.—The operations this month will depend greatly on the weather. If wet, both planting and transplanting may be done at the same time. Camellias, gardenias, &c., may be removed with safety. Plant out all soft-wooded plants such as verbenas, petunias, penstemons, &c. Sow annuals, as carnations, pansy, mignonette, daisy, snapdragon, dianthus, stocks, candytuft, phlox, sweet peas, &c. Those already up must be pricked out into other beds or into their permanent positions. Growth just now will not be too luxuriant, and shrubs and creepers may be shortened back. Always dig the flower beds rough at first, then apply manure, dig it in, and after this get the soil into fine tilth. Land on which you wish to raise really fine flowers should have a dressing of bonedust lightly turned in. Wood ashes also form an excellent dressing for the garden soil. Prune out roses. These may be planted out now with perfect success. Take up dahlia roots, and plant bulbs as recommended for March.

The Department has now prepared a booklet on "Flower Gardening for Amateurs," which may be obtained on application to the Under Secretary for Agriculture and Stock. Price, TWO SHILLINGS.

Agriculture.

ASPARAGUS.

Farmers and market gardeners in this State do not give sufficient attention to the cultivation of this valuable vegetable. Wherever there is a deep, rich, friable, sandy soil, well drained, and in an open situation, there asparagus will flourish. The cultural conditions necessary to grow it are of the simplest. It should be remembered that an asparagus bed, once planted, will not need to be replanted for a dozen years, provided, of course, that the conditions mentioned below are regularly observed. If the soil is not naturally rich, or even if it is, the beds must be carefully prepared, and this should be completed at least two months before putting in the plants or seed. The reason is that the soil will have time to become somewhat compact, and the asparagus likes it to lie close together when forming new roots. The first thing to do is to plough the ground deeply. In a small garden, dig deeply, turning over a spit and a-half of soil. Lay out the bed in trenches. Then supply rich, well-rotted farmyard manure, and mix it thoroughly with the subsoil. Bone dust is also valuable as an adjunct to the manure. Then turn the enriched subsoil under and replace the top soil, which should also be mixed with well-rotted cow or horse manure, together with bone dust and a little salt. For field culture the drills thus prepared may be 3 ft. apart. In gardens, 2 ft. is sufficient. If roots are to be planted, put them in at intervals of from 12 to 18 in. in drills. The next thing is to mulch the surface with stable or farmyard manure to a depth of from 6 to 9 in. The whole may be watered if the season happens to be a dry one, otherwise, watering is scarcely necessary where the mulch is deep.

The best time to plant is June and July, so now is the time for the intending grower to prepare the beds.

There are two methods of laying down an asparagus bed—one by planting roots, or crowns as they are called; the other by raising plants from seed. Plants so raised are always the more robust and durable, and also they produce the largest crops. The objection to this plan is that it takes four seasons before the first crop can be cut, whereas by planting one-year-old crowns a first cutting will be obtained in the second season, say, in about fifteen months, One-year-old crowns are preferable to old ones, as they transplant more readily.

The beds should not be made wider than 4 ft., which will admit of two rows being planted in each bed. When planting crowns, carefully spread out the roots, and leave the crowns 2 in. beneath the surface. By the end of October the young shoots will appear above the mulch, and these must be cut well below the ground when they are 2 or 3 in. high. Once cutting has commenced, it must be done regularly during the season, which lasts from six to eight weeks, and during that time no shoots must be allowed to develop. Great care is necessary when cutting not to injure the roots, therefore it will be found best to use a special, narrow, long-bladed knife. If the field-grower prefer to raise plants from seed, it should be sown in August, in rows 18 in. apart, at a depth of 2 in., or the seed may be sown broadcast in beds not previously manured, and subsequently transplanted. If sown in rows, the ground must be thoroughly prepared according to the above directions. Then let all the plants grow until they are large enough for forcing, when every other row must be dug up, and also all plants in the remaining rows which are closer than 18 in. to each other must be removed. The rows will now be 3 ft.

apart. The plants which have been removed may be planted out in other properly prepared ground. When the season is over, allow the plants to make their natural growth, and when the tops begin to turn yellow in autumn cut them down level with the ground. Be careful not to allow any seed to ripen and fall to the ground, or thousands of young plants will spring up all over the bed. Then fork over the surface and mulch with manure, salt, kainit, or a little guano. In the early Spring the beds should be again forked over, and a dressing of salt applied. The shoots may be blanched by a slight earthing up some time before cutting.

IRRIGATION.

THE USE AND ABUSE OF WATER FOR PLANTS.

By C. A. BARBER, Government Botanist, Madras.

Everyone knows that plants require water at their roots. Even the wild plants growing in dry, almost rainless tracts need it, and they are only able to live because they have the power of sending their roots very deep down into the ground in search of it. Where water is scarce the growth of plants is meagre and slow, and if, after being well supplied for a time, the water is cut off, they wilt and lose their shape and, unless quickly relieved, are in danger of death. In a cultivated crop the plants produce their flowers and fruits before the time. The yield under such circumstances will be small indeed, and the grain will be empty and worthless.

Water is of use to the plant in many different ways. In the first place, it is a necessary food. Animals, as you know, need water as a drink, but plants need it much more. Much of the plant's substance is made up of water, and, with an insufficient supply, the tissues become hard and woody. Plants can only take up their food in the liquid form. Water coming out of the ground into the roots always has mineral matters dissolved in it. And this is the food which the plant needs for its growth. It is also necessary that the food solution should be exceedingly dilute. And thus a very large quantity of water is constantly passing up the stem to the leaves, where it is given off in the form of vapour. Lastly, water is necessary for the plant to keep its proper shape. If there is not plenty of water, it becomes limp and hangs over, and in order that it may spread out its leaves to the sun, its tissues must be tense and stiff with water. Its branches must spread out, and its flowers must be fully expanded, in order that it may bear its fruits and ripen them. Otherwise the crop will be a failure.

Now, of all the sources from which the plant gets water, the rain is the best. In countries where rain falls more or less all through the year, perhaps a good shower once or twice a month, there are no tanks, no irrigation channels, and no big wells. Such, for instance, are the West Indian Islands.

The rainfall in some of them is no greater than in Madras, but it falls at fairly frequent intervals, and there is no long period of hot, dry weather. In England the annual rainfall of many parts is much less than in Madras, only in fact as much as there is in Coimbatore. But the rain falls in slight showers, and the air is cool. The ground is covered with grass, and everything looks green. Where, however, the rain, although great in quantity, falls more or less at one season of the year, and there is practically none for long periods, irrigation becomes a necessity for a crop to be grown at all. The water is diverted for long distances from the great rivers, the surface wash is carefully collected and stored in large tanks, and deep wells are dug to get the sub-soil water.

But irrigation has its disadvantages. It is not to be compared with the silent rain coming out of the skies. In the first place, plants, like animals,

need a thorough wash now and then. Otherwise their leaves get clogged with dust, and they cannot breathe, and insect pests multiply till they endanger the life of the plant. Insects can never make much headway if the plants are properly washed by the rain. In the second place, there is always danger of over-watering. The ryots of India have not learnt really how little water will suffice for the production of a good crop, even of paddy. The cultivators in India, knowing that water is a good thing, and necessary for the production of a good crop, have apparently come to the conclusion that the more of it they give the larger the crop they will reap. But this is very far from being the case. If too much water is given, the air is driven out of the soil, and the ground becomes water-logged. Hence arise numerous diseases, chiefly of a fungoid nature. Most of the diseases of sugar-cane in the Madras Presidency, for instance, are caused by giving too much water in irrigation. It is nearly as important to take the water off the land as to put it on. Proper drainage must always go hand in hand with irrigation. And any place which lies too low for the water to flow off readily must be irrigated with the greatest care.

Lastly, the most important disadvantage of irrigation lies in the dreaded *coudu* or salt land. When land is irrigated for many years, it frequently becomes full of harmful salts so as to be absolutely valueless for growing crops. Where alkali is formed, plants will not grow at all. Alkali land can be in great part avoided by careful attention to drainage, but if this be neglected it will take many years before the ground can be got into good condition again.

These facts should be thought about by all who use wells for garden irrigation, and by all cultivators of wet lands.—"Madras Agricultural Calendar."

ROLLING WINTER WHEAT.

By E. G. MONTGOMERY.

In the autumn of 1900 several winter wheat plats were laid out for cultivation experiments. They were all sown to Turkish Red winter wheat, some being sown broadcast and others put in with a press drill. It was planned to harrow the wheat after it was up. Some of the plats were to be harrowed in both fall and spring, others to be harrowed only in the spring, while a third set were to be rolled. The following table gives a summary of the yield secured for four years:—

A SUMMARY OF FOUR YEARS' EXPERIMENTS, SHOWING THE EFFECT OF HARROWING AND ROLLING ON WINTER WHEAT, WHEN SOWN BROADCAST AND DRILLED.

Method of Planting.	Treatment.	1902.	1903.	1905.	1906.	Av.	Method giving larger yield.
		Bu.	Bu.	Bu.	Bu.	Bu.	
Drilled	Harrowed in spring ...	23·8	28·0	36·9	61·0	37·3	No cultivation, ·9 bushel more
Drilled	Not cultivated	30·3	28·8	34·3	59·6	38·2	
Broadcast ...	Harrowed in spring ...	21·0	26·5	40·2	53·8	35·3	No cultivation, 2·9 bushels more
Broadcast ...	Not cultivated	27·1	29·0	39·4	57·4	38·2	
Drilled	Harrowed fall and spring	30·6	27·5	33·3	59·9	37·8	Difference less than one bushel
Drilled	Harrowed in spring ...	23·8	28·0	36·9	61·0	37·3	
Drilled	Not harrowed	30·3	28·8	34·3	59·6	38·2	
Drilled	Rolled in spring	37·9	33·3	38·8	63·3	43·3	Rolling, 5·1 bushels more
Drilled	Not harrowed	30·3	28·8	34·3	59·6	38·2	
Drilled	Rolled and harrowed in spring.	32·8	28·1	36·6	62·4	40·0	Rolling and cultivating, 1·8 bushels more
Drilled	Not harrowed	30·3	28·8	34·3	59·6	38·2	

It is apparent from the above data that during the past five years no increased yield could be secured from harrowing winter wheat. Harrowing broadcasted wheat resulted in an average loss of almost three bushels per acre, while harrowing drilled wheat resulted in a loss of nine-tenths of a bushel per acre.

It should not be assumed from the above data that the cultivation of wheat would not be of value in drier regions. Cultivation is for the purpose of conserving moisture, but in the years in which the above data were taken on wheat there was no lack of moisture. In fact, in the two seasons when spring rainfall was below normal (1905 and 1906) there was some increase from cultivation.

EFFECT OF ROLLING ON WINTER WHEAT.—Rolling winter wheat in the spring has not failed in any of the four years to give an increased yield, the average increase being 5·1 bushels per acre. The rolling was given early in the spring, soon after frost was out, and about the time growth started. Harrowing after rolling was not as good as rolling alone, probably due to loosening up the plants again after the roller had pressed them firmly into the soil.

Early spring rolling of winter grain, pressing the earth as it does firmly about the plant roots, produces good results. When frost comes out in the spring it is very apt to leave the soil filled with small cracks or checks, especially around the plants. If these checks are examined closely, it will be seen that a large number of roots are thus exposed, and if the weather continues dry they are killed, or at least injured. We have taken up plants in the spring where half of the roots were injured in this manner.

If the soil is not wet at the time of rolling—and it should never be rolled when wet—rolling aids in no small degree to form a surface mulch. It does this rather than compact the surface.—Press Bulletin No. 30, Agricultural Experiment Station, University of Nebraska, U.S.A.

SMUT IN WHEAT.

Some very fine samples of wheat have been produced at Inglewood, but unfortunately sufficient attention was not paid to preparing the seed before sowing, in order to prevent the ears being attacked by smut or bunt. The pickling of seed wheat is a very simple and inexpensive process. It may be done with a solution of formalin, with sulphate of copper (bluestone), or with plain hot water. In order to understand the treatment, is is necessary to know that infection can only take place when the plant is young and tender, and the fungus filaments grow inside, keeping pace with the growing plant, until the young seeds are formed, and then the fungus uses all the nourishment stored up there for the production of its reproductive bodies or spores. These spores are so light and so numerous that, in harvesting operations, they readily become attached to the healthy grain, and, if the conditions are favourable, infect the young plant when germination occurs. It is evident, then, that prevention must be resorted to, and the seed to be sown is treated in order to destroy or prevent the germination of the spores. The most commonly used pickles are those above mentioned. The solutions for pickling are:—Bluestone, at the rate of 1 lb. in 5 gallons of water, or formalin at the rate of 1 lb. in 40 gallons of water.

The seed, in either case, may be spread on a wooden floor, and the solution sprinkled over it, turning the grain over and over, either by shovelling or raking, so that all the grains become thoroughly wetted. The seed is then spread out to dry, and, if left in a thin layer overnight, it is ready for sowing in the morning. Instead of sprinkling, which is wasteful, dipping may be

resorted to. A bushel or so of seed is placed in a bag and dipped in the solution, taking care that all the grains are thoroughly wetted by shaking the bag and plunging it in and out.

In the case of bluestone, only a minute or two is necessary for the dipping process, on account of its corrosive action; but, in the case of formalin, five minutes may be allowed, and it is less injurious to the grain, the cost being about the same as for the bluestone process.

Both processes are equally effective in destroying the smut. The bluestone solution may be used again and again, but formalin is volatile, and it follows, therefore, that only the amount of formalin should be prepared that is required for immediate use, and sprinkling in this case should be preferred to dipping.

Schering's formalin is the best, and can be had at about 2s. 10d. per lb. in 1-lb. bottles. Formalin is poisonous, and must be kept where there is no chance of children or others obtaining it in ignorance of its nature. One gallon of formalin solution is sufficient for 4 bushels of seed.

For the hot-water treatment, two boilers are needed, containing water at 120 deg. Fahr and 135 deg. Fahr. respectively. A smaller vessel containing boiling water and an abundant supply of cold water should be at hand.

The seed to be treated may be placed in a gunny bag or in a perforated kerosene tin. Plunge the vessel containing the grain into the first boiler (120 deg. Fahr.), and move it about for a minute or two till the grain has all been warmed. Take care to keep up the temperature. Then plunge it into the second boiler (135 deg. Fahr.). Leave it there for ten minutes, moving it about, and agitating the grain. Then take it out and plunge it into cold water, and then spread it out to dry, after which it is ready for sowing.

THE TREWHELLA STUMP-GRUBBING JACKS.

It is claimed that Messrs. Tangye Bros., specialists in hydraulic machinery, by their hydraulic jack launched the "Great Eastern," and that by doing so launched themselves into business.

And so we find that Messrs. Trewhella Bros., engineers, of Trentham, Victoria, specialists in the manufacture of instruments and machines for the grubbing and clearing of land, and the handling of logs, have succeeded by devoting all their energies and attention to this one object.

Mr. A. Robinson, of 55 Adelaide street, Brisbane, who now represents them in Queensland, informs us that the brothers commenced life on a farm in one of the heavy forests in Victoria. That, after one had obtained a mechanical education, they worked together for several years with sawmills in the forests. Their inventions were, for some time, devoted to supplying the needs of their business, and of the local farmers with what appeared necessary to deal with the timber on their farms.

The demand created in this way, coupled with the exhaustion of the forest for sawmilling, caused them to consider the prospect of devoting themselves to the production and sale of specialties for forest countries, with the results that, by close attention to minor details regarding quality of materials and workmanship in the working parts as well as new designs, the name of Trewhella has become a guarantee of usefulness and durability in power-giving machinery specially designed for forest work, combining the greatest power, durability, and handiness with the least possible friction and breakages.

Perhaps the better guarantee of the usefulness of these machines is the fact that their manufacture is yearly increasing. Depôts are now established throughout the Commonwealth of Australia and New Zealand, and also in several foreign towns where forests impede the progress of the world's settlers.

The excellence of their manufactures and their suitability for the purpose for which they are designed are most signally demonstrated by the demand for

them which has arisen of late years from all parts of the world, their fame having spread to distant countries in a surprising manner. To enable that demand to be met in the most economical manner, freight arrangements being a difficulty, Messrs. Trewhella Bros. have found it necessary to start branch works in Birmingham, in the old country. Australia has reason to be proud of an enterprise started in Australia by Australians, the merit of whose manufactures has thus received world-wide recognition, and it is to be hoped these inventive gentlemen will long continue to reap a due reward for the benefits they have conferred upon their native country.

Their specialties are designed for the heavy and expensive work of land-clearing. They manufacture stumping and grubbing jacks of various types, some inexpensive for light work, others for heavier work, which cost more, but are still very low in price, when the work they do is considered. Some are designed for stumping, others for dealing with standing trees. They are simple in mechanism, and no experience is necessary to effectively handle them. They can also be used in log-rolling, in clearing rocks from the land, and in any heavy lifting where they can be applied; in fact, their uses are innumerable, and after the land has been cleared of stumps and trees the jack will be found to be one of the most useful machines on a farm.

ELECTRICITY IN AGRICULTURE.

NITROLIM.

CYANAMIDE AS A FERTILISER.

The calcium cyanamide mentioned in this issue in connection with the destruction of charlock is a cheap concentrated nitrogenous manure, said to be very effective, and is guaranteed by the makers to contain at least 18 per cent. nitrogen. It is intended as a substitute of nitrate of soda and sulphate of ammonia as a nitrogenous fertiliser. The active fertilising constituent of nitrolim is nitrogen, just as it is in nitrate of soda or sulphate of ammonia, and it is, therefore, necessary that the crop should also have a good supply of phosphate of lime and potash from the previous crop, or applied by suitable artificials.

In order to ensure the best results with this manure, the following general rules should be observed in its application:—Spread the fertiliser as uniformly as possible ten to fourteen days before sowing. Bury it to a depth of between 4 and 8 in. with plough, harrow, hoe, or spade, and, whenever practicable, immediately after spreading.

The quantity to be applied varies from 1 to 2 cwt. per acre, according to the character of the soil and crop. On light sandy soils it is advisable to apply the smaller quantity in two dressings, while on heavy (clayey) soils the larger quantity can be applied with advantage at one application. For mangolds, potatoes, and market garden produce, the above quantity is sufficient, especially if only a moderate dressing of farmyard manure has been applied. As nitrolim is a very concentrated fertiliser, excessive dressings, being wasteful, should be avoided. It should not be spread in rainy or windy weather, and unless it has been previously well mixed with from one to four times its weight of finely-divided soil or vegetable mould, and allowed to stand ten to fourteen days, it will not yield best results as a top dressing.

An excellent mixture can be made with nitrolim and superphosphate by mixing them in the proportion of 1 part nitrolim to 6 parts superphosphate, up to 1 to 3.

Nitrolim is being very extensively used in the West Indies and Mauritius for sugar-cane growing, and is giving very excellent results.

We are not aware of the cost of nitrolim in this State, but all information concerning it may be obtained from the agents, Messrs. Trackson Bros., Ltd., Electrical Engineers, Elizabeth street Brisbane.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF JANUARY, 1910.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Careless ...	Jersey	27 Sept., 1909	972	4·6	50·28	
Cocoa ...	"	12 Sept. "	920	4·7	48·69	
Peewee ...	Holstein-Shorth'n	29 Aug. "	974	4·0	43·75	
Eve ...	Jersey ...	1 Nov. "	813	4·6	42·06	
Whitefoot ...	Holstein-Devon ...	1 Oct. "	997	4·1	45·76	
Conceit ...	Ayrshire	17 Nov. "	1,002	3·9	43·60	
No. 112 ...	Grade Guernsey ..	25 Dec. "	910	4·1	41·74	
Lady Kelso	Shorthorn... ...	2 Oct. "	921	4·0	41·16	
Auntie ...	Ayrshire	23 Aug. "	876	4·1	40·18	
Lark ...	"	14 Aug. "	937	3·8	39·67	
Orange ...	Grade Guernsey ...	13 Dec. "	793	4·4	39·16	
Vixen ...	Shorthorn ...	28 Dec. "	822	4·2	38·67	
Dewdrop ...	Holstein	1 Nov. "	882	3·7	36·31	
Bee	Jersey	23 Dec. "	674	4·7	35·67	
Rosalie ...	Ayrshire	6 Jan., 1910	841	3·8	35·61	
Ethel ...	Grade Holstein ...	8 Oct., 1909	829	3·8	35·10	
Daisy ...	Holstein	29 Dec. "	1,001	2·7	34·84	
Redrose ...	Shorthorn... ...	21 Sept. "	773	4·0	34·54	First calf
Lass ...	Ayrshire	13 June "	737	4·1	33·80	
Glen ...	"	29 Jan. "	573	5·0	33·35	
Bangle ...	Shorthorn ...	26 Dec. "	783	3·8	33·59	
Honeycombe	"	11 April "	750	4·0	33·52	
No. 6 ...	"	19 Nov. "	834	3·6	33·36	
Lavina's Pride	Ayrshire	9 Nov. "	744	4·0	33·24	First calf
Tiny ...	Jersey	15 Sept. "	578	5·0	32·63	
Dot ...	Shorthorn ...	1 Nov. "	727	4·0	32·49	
Burton's Lass	"	14 Sept. "	724	4·0	32·35	First calf
Réstive ...	"	30 Oct. "	705	4·1	32·33	
Stranger ...	Grade Shorthorn	12 Oct. "	704	4·0	31·46	
Night ...	Grade Holstein ...	23 Sept. "	772	3·6	30·88	
Reamie ...	Ayrshire	7 July "	708	3·9	30·81	
Chocolate ...	Shorthorn	15 June "	673	4·1	30·86	
Rhoda ...	Grade Shorthorn	4 Aug. "	727	3·8	30·77	

Grazed on natural pasture only.

DAIRY SHORTHORNS.

Mr. George Taylor, Cranford, read an able paper (says the "Live Stock Journal") on "Pedigree Dairy Shorthorns" before the Bishop's Stortford Chamber of Agriculture.

In olden times, said Mr. Taylor, we had a sharp division between the milk and the beef Shorthorn. To some extent we have it to-day, for both of these qualities in the red, white, and roan are cultivated by the provision of special classes at our leading shows. It is a good sign when breeders realise that the Shorthorn is not intended for one purpose only, but that its extraordinary adaptability should be turned to whatever use the farmer finds for it. When Amos Cruikshank gave to the world what is known as the Aberdeenshire type of Shorthorn, to a very large extent he revolutionised that breed, and the wonderful successes which followed the Scotch animal, and the progeny of

the Scotch cross in the showyard, temporarily diverted attention from the other highly important qualification of milk production.

But that could not last very long, as there were too many inquiries for bulls of long pedigree and of dairy type—that is to say, with milking blood in their veins—to enable breeders to neglect that highly important quality in the Shorthorn. There is room enough in England to-day for all sorts and all conditions of live stock, and if we are still able to maintain what might be called the local breeds of domestic stock in a flourishing condition, surely it is not too much to expect that the enthusiasm of breeders will find a place for Shorthorns that will produce milk as well as Shorthorns that carry beef.

When establishing a herd of pedigree milking Shorthorns, one must naturally look to the cow with dairy characteristics. I would place first and foremost a kindly head and shapely bag, with well-placed teats. Constitution must not be neglected, and I place great importance upon the selection of bulls if you intend to breed a milking herd. I think whatever the extra cost may be it is money well laid out if anyone before buying a bull will go to the herd where he is bred and see his dam, and, if possible, his sire also. The influence of the dam is specially pronounced in milking pedigree Shorthorns, and this policy I know is followed by many of the best breeders of horses, who consider it of greater importance to study the character of the dam than even the character of the sire. There is such a great demand for bulls nowadays that I urge particular attention to this, for as far as I am personally concerned my supply cannot meet the demand fast enough.

In laying the foundation of a herd, one naturally looks a good deal to blood, and in a milking herd the old Bates families are essential. Yet one cannot altogether, having regard to the foreign demand for long pedigrees and to the high prices paid for really good bulls—one cannot altogether neglect the Scotch cross. One cannot expect bulls bred with a strong milking pedigree to look quite the same as those which are the product of beef strains alone. These latter one expects to be much thicker and blockier near the ground and deep through the heart; but if we get bulls of ample frame, with their lines right and colours good, with a nice amount of flesh, we have no difficulty whatever in finding customers at remunerative prices.

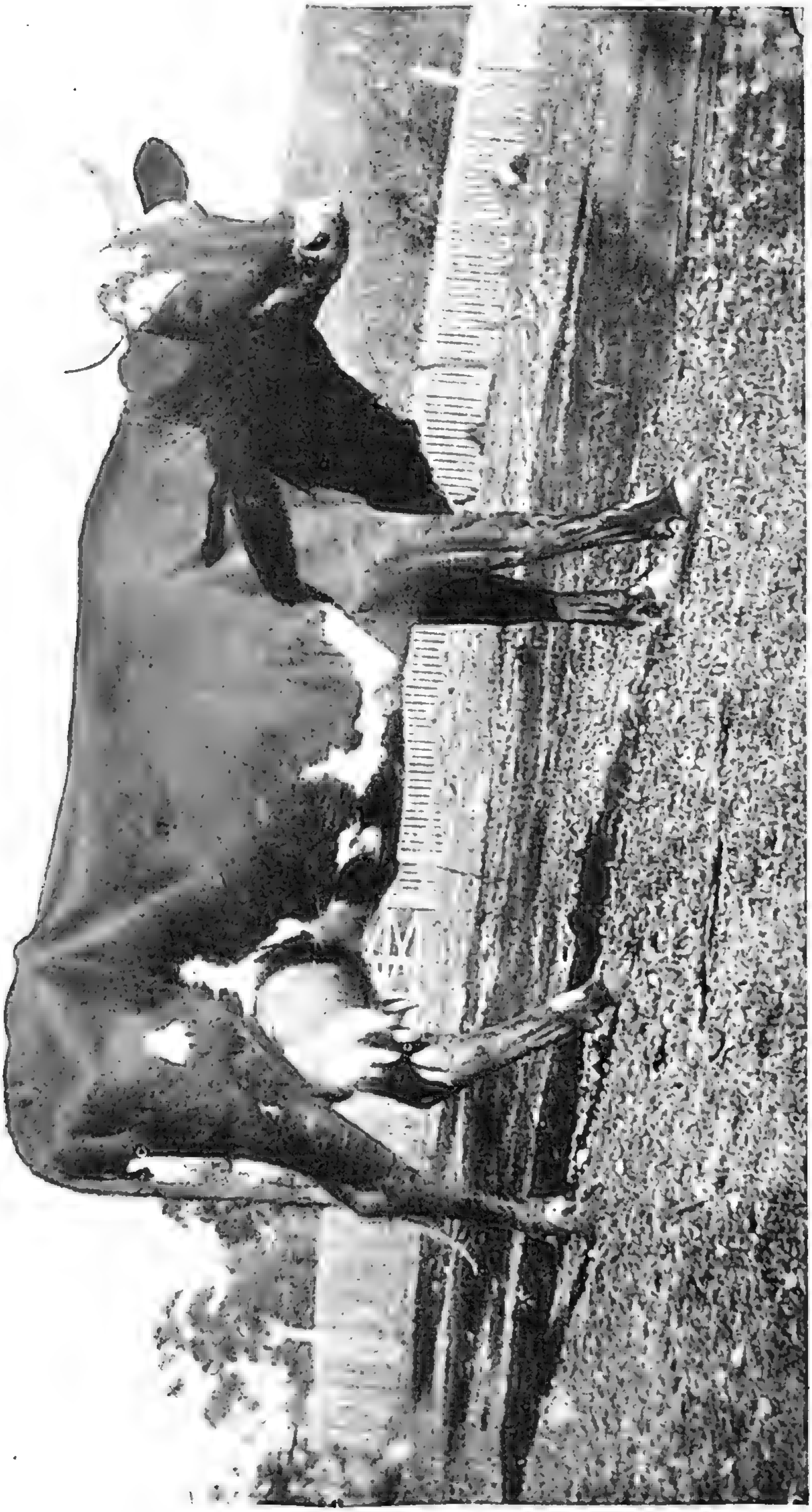
Milk and beef are very difficult to get right throughout the herd—that is to say, one naturally expects in a herd which is devoted solely to producing animals of a beef type to find them more perfect there than in a herd whose chief duty is to fill the pail, and *vice versâ*. We must therefore maintain the ideal of milk and beef in the one animal. This can be got in individual cases, but, as every practical breeder knows, our heaviest milkers often make the poorest show of flesh, so that I think we ought to be content that our pedigree dairy Shorthorns while they are filling the pail should perform that duty satisfactorily, and when they go dry show a ready aptitude to put on flesh. I should not say altogether that the pursuit of milk and beef in one animal is altogether illusory, for so long as the Shorthorn *is* the Shorthorn we must necessarily cultivate both qualities; but he would indeed be a fortunate man who could find all the best qualities of the dual type combined in one herd, as we occasionally find them in individual animals.

THE JERSEY-HEREFORD COW.

The accompanying illustration of Mr. Munro Hall's Jersey-Hereford cow Spot was unavoidably held over from the March issue of the Journal, which see for an acount of the evolution of the breed. Spot was born 24th May, 1904. Her mother was a Hereford, and the sire a Jersey.

The first calf was a bull prematurely calved. The second a heifer, Buttercup; the third a bull, Peter Pan, and the fourth a heifer, Primrose.

Plate IX.



Mr. Munro Hall's Jersey-Hereford Cow, Spot.

POINTS OF BEEF CATTLE.

By P. R. GORDON.

The plate of a Shorthorn bull, with the points indicated on it, so far as they can be so, is—as was the case with the preceding two—copied from Mr. Alexander Bruce's writings on the subject. In all previous schedules of points of cattle that have come under my observation no attempt had been made to expressly classify the points of, perhaps, the greatest importance from a breeder's point of view—namely, those that cannot be represented by diagram. They have been given special prominence in the following schedule. In working out the schedule I had before me several scale of points, and in these I found that to restrict the aggregate of points to 100 would be to unduly undervalue many of the minor points, and without departing from the decimal system I have adopted one of Mr. Bruce's alternate aggregates—namely, 250. I have selected the Shorthorn for the purpose of scale of points; but the other beef breeds—namely, Hereford, Devon, and Aberdeen Angus—are so similar that the scale will apply to them, or any other beef breed of cattle.

The first 10 points cannot be shown by diagram.

DESCRIPTION OF POINTS, AND THEIR VALUES.

1. "Pedigree."—According to standing in Herd Book—20 marks.

2. "Offspring."—The character of offspring as shown by their success at shows—20 marks.

3. "Carriage and Style," is that form and carriage at once recognised, with the lines of the body not sharp or abrupt, denoting purity of blood and high breeding—10 marks.

4. "Size."—The preferable size is a medium one approaching to large; extra large animals are, as a rule, less hardy, and require proportionately more and better food—7 marks.

5. "Vigour" is indicated by width of forehead, well-developed neck and horns, roundness and capacity of barrel, and robust and muscular appearance—value, 10 marks.

"Quality."—Which may be described as certain external properties, which may be seen and felt, indicative of high breeding, a disposition to early maturity, and of having the frame, especially in the prime parts, covered with valuable meat, and the fat evenly distributed throughout the whole carcase. Of quality, there are two sub-divisions—(1) "General quality," and (2) "Head." In the former subdivision 6 points are allotted, namely:—

6. "Bone."—As shown in that of the leg under the knee, should be fine, but not so fine as to indicate weakness of constitution. Coarseness of bone is incompatible with "quality." In coarse large-boned animals a great proportion of the nutriment in the food goes to making and supporting bone, which in the fine-boned beast is made into meat—value, 6 marks.

7. "Colour" should be any variety of red and white, as roan, or red and white, or altogether white. The richer the colour the better; but red inclining to black, or light red inclining to yellow, is objectionable, as well as red and white spotted—value, 4 marks.

8. "Hair" should be fine, long, wavy, silky, and abundant, with soft mossy undergrowth—value, 6 marks.

9. "Handle."—That is, touch and handle.—The quality of an animal with respect to touch is ascertained by a slow, comparatively light, but firm pressure with the points of the fingers on the different parts of the animal, especially along the chine, back, ribs, loin, and rump, and on the hip or hook bones; and if it is in fair condition, and stands well in this point, the feeling

under the fingers will be firm, but yielding, which indicates the existence of fat between the skin and flesh, and aptitude to fatten. The flesh itself should be yielding and elastic, especially on the ribs, point of the rump, and at the setting on of the tail. In handling, the thickness and elasticity of the skin must be ascertained. It should be of medium thickness, and not so thin as to indicate that the animal can undergo no hardship; neither should it be loose, but moveable, mellow, soft, yielding, and elastic. Value of touch and handle, 12 marks.

10. "Evenness of flesh and fat."—The meat should be evenly, fairly, and deeply laid on over the whole carcase, especially on the prime parts, and the fat should be fairly distributed throughout the whole. Patchiness on the shoulders, ribs, loin, or rump—especially on the last—is a decided fault in young stock, as the fat, instead of being evenly distributed throughout the carcase, as indicated by the marbled appearance of first-class meat, is largely collected at the patchy parts—value, 7 marks.

In the "Head"—the second subdivision of quality—there are seven points, described as under:—

11. The "Muzzle" should be broad, full, and dewy. The colour should be cream, orange or light drab, but never smoky or black, which indicate inferiority of blood—value, 3 marks.

12. The "Nostril" should be wide, high, and open—2 marks.

13. The "Forehead and Face."—The forehead should be short and broad, denoting vigour, while in the cow it should be longer and narrower. The face should be comparatively short, lean of flesh, and somewhat dished or concave—value, together, 5 marks.

14. The "Eye" should be prominent, bright, mild, lively, and trustful, and the expression should be cheerful, open, gentle, and contented—value, 4 marks.

15. "The Horn and Ear."—The horn should be comparatively short, moderately thick, well-shaped, flattish and waxy, not clean and white, nor blackened, except at the extreme tips. It should incline outwards, and not much upwards—value, 6 marks. The ear should be large, thin, yellowish inside, erect, lively in action, and hairy—value, 1 mark; total, 7 marks.

"Form" means symmetry and utility of carcase—*i.e.*, a handsome, well-developed, healthy frame, with lines straight above and below, and fulness and largeness in all the prime parts, and smallness in the inferior, or offal.

Of "form" there are four subdivisions—(1) forequarter, (2) middle, (3) hindquarter, and (4) legs; and in the first of these subdivisions—forequarter—there are 9 points, namely:—

16. The "Neck and Throat."—The neck should be clean, somewhat long and arching (bull-necked), which shows strength and masculine vigour, a most essential point; but the rise of the arch of the neck should never extend to the shoulders, and the neck should be fine at the setting on of the head. The neck-vein ought to be well developed, and should run full and evenly into the shoulder. The throat should be fine, clean, and free from superfluous skin—value, 8 marks.

17. The "Breast."—The space between the forelegs, viewed in front, should be wide, full, and swelling, indicating thickness through the heart and capacity of chest—value, 4 marks.

18. The "Brisket" should be full, deep, broad, and projecting forward in front of the leg, and downwards nearly to the knee. There should be no dew-lap, beyond a slight pendulous thread. Although a deep brisket is not an absolute guarantee of a deep chest, the two generally go together. A deep brisket is not always to be met with in well-shaped cattle, but it is indicative of a propensity to fatten—value, 3 marks.

19. The "Crops"—the top of the shoulder—should be full and well covered with flesh, but not too wide. If they are very thick, straight, and open, the animal will never have good action—value, 4 marks.

20. The "Shoulder" should be well developed, and covered with muscle from its point to the crops. The shoulder-blade should be fairly laid back to ensure action, and a good fore flank. A too upright shoulder invariably entails a protuberant, bare shoulder-point and meagre fore flank—both bad faults—value, 8 marks.

21. The "Forearm" should be broad, large, straight, and muscular—value, 3 marks.

22. The "Chine"—the space between the crops and back—should be round, and so full as to leave no hollow behind the shoulder. Nothing can compensate for a deficiency in this respect. It takes away substance from one of the very prime parts. The top of the chine should be on a level with and run well into the back—value, 9 marks.

23. The "Foreribs" should be round (hooped), deep and capacious throughout, running down wide and deep to give plenty of room for the heart and lungs. They should especially stand well out behind the shoulder. A bull with bad foreribs and a narrow contracted chest—hollow behind the shoulder—should be set aside, whatever other good qualities he may possess. A well-known authority has said, "There must be ample room for the heart to beat and the lungs to play, otherwise sufficient blood for the purposes of nutriment and strength will not be circulated, nor will it undergo the vital change which is essential to the proper discharge of every function." Deficient in this respect he is literally a "bad-hearted" animal, and his stock will lack vigour of constitution, and be liable to succumb to disease—value, 5 marks.

24. "Foreflank" should be deep and well developed, and should run full and evenly into the shoulder—value, 6 marks.

In the middle subdivision there are five points, described as follows:—

25. The "Back" should be straight and broad, and on the same level as the chine and loin. It should be well covered with flesh, and should run full and wide into the loin—value, 5 marks.

26. The "Back Ribs" should spring roundly in an arch from the back, and run well back towards the hind quarters, so as to leave little space between the ribs and the hips or hooks—*i.e.*, to be well ribbed home (a most essential point), while the two or three last ribs should be broad, arching, and well let down—value, 8 marks.

27. The "Belly" should be neither tucked up nor too low in the middle—that is, "pot-bellied"—but roomy and fairly let down, giving space for a capacious paunch. There should be room for ample materials to keep up the necessary supply of blood—value, 3 marks.

28. The "Loin" should be full, level, broad, and well covered with flesh. When properly developed, it should appear to extend far along the back. It is a prime part of the carcase, besides giving additional strength to the animal; and in moderately fat animals, at least, it is one of the points by which a purchaser is guided in judging as to their condition—value, 10 marks.

29. The "Flank" should be full, swelling, low and deep. This, too, is one of the chief points noticed by the buyer in judging as to the condition of cattle, and ought for this and other reasons to be cultivated—value, 10 marks.

The Hindquarter subdivision comprises seven points, described as follows:—

30. The "Hip or Hook."—The width, measuring from the crown of one hip bone to that of the other, should be comparatively wide, but not protruding, nor too large. It should be on a level with the loin and rump. The hip bones should be well covered, and feel comparatively soft to the touch—value, 3 marks.

31. The "Rumps."—The length from the crown of the hip to the point of the true rump, and the width across behind from point to point, should be long and wide, square and level on the top, with the space between the hip and the tail and the points of the rumps well filled up with flesh and fat, without patchiness or gaudiness. A wide, long, level, well filled up rump, and a good handle at the tail and haunch, are sure indications that the animal is of the right sort; and these points are also of importance through the meat on them being all of the primest quality—value, 10 marks.

32. The "Tail and Set-on."—The tail should be set symmetrically on a level with the rump, loin, and back. It should be strong and broad at the root, but rapidly tapering to fine and round at the brush. It should, when not raised, fit neatly in between the points of the rump bones. It should neither rise at the root, with a cock or curve, above the level of the rump, nor should it run far up the rump, nor droop—*i.e.*, it should be set square on—value, 7 marks.

33. The "Quarter"—the length and width below the rump and above the thigh—should be wide, level, and square. It should come down straight and full to the thigh, but it should not be rounded like that of a horse, which is a sure sign of coarseness—value, 6 marks.

34. The "Thigh" should be broad, strong, short, and well developed—value, 4 marks.

35. The "Twist"—the filling up between the thighs—should be full, broad, well filled, making the thighs meet low down—value, 8 marks.

36. The "Testes" should be well developed—value, 2 marks.

37. "Knee and Gambril, or Hock."—The fore knee should be broad in front, clean, and well developed. The gambril (or hock) should be long, broad, clean, muscular, and nearly straight to the ground—value, 7 marks.

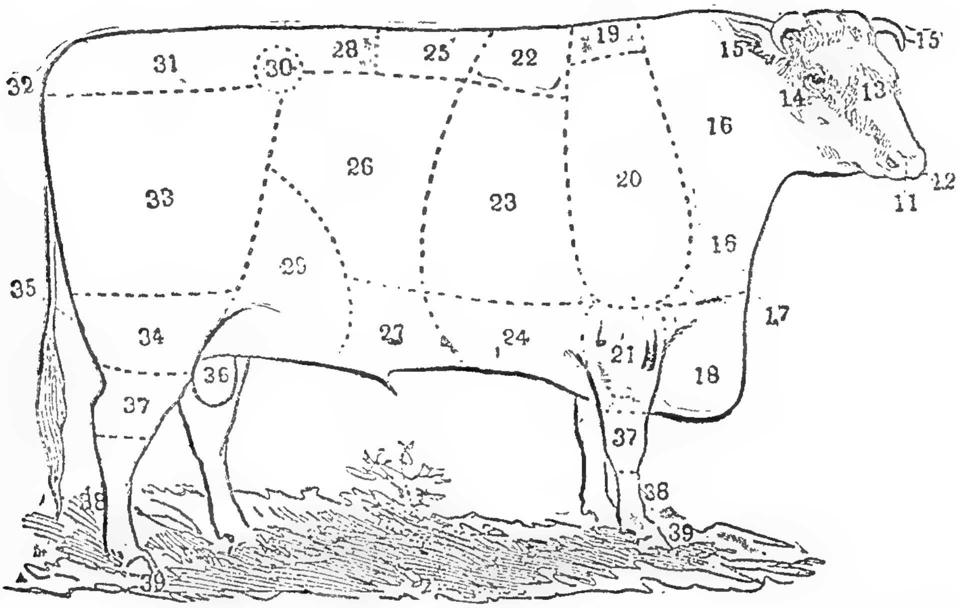
38. The "Leg" should be short, straight, wide-set, clean, and well proportioned, and under the knee and gambril it should be moderately fine and sinewy—value, 2 marks.

39. The "Hoof" should be clean, short, and well proportioned—value, 1 mark.

Recapitulation.

	Value-Marks.		Value. Marks.
Pedigree, &c.	20	Shoulder	8
Offspring	20	Forearm	3
Carriage and style	10	Fore flank	6
Size	7	Back	5
Vigour	3	Back ribs	7
Bone	6	Belly	3
Colour	4	Loin	10
Hair	6	Flank	10
Handle	12	Hip	3
Evenness of flesh	7	Rump	10
Muzzle	3	Tail and set-on	7
Chine	9	Quarter	6
Nostril	2	Thigh	4
Fore ribs	5	Twist	8
Forehead and face	5	Testes	2
Eye and expression	4	Knee and hock	7
Ear and horn	6	Leg	2
Neck	8	Hoof	1
Breast	4		
Brisket	3		
Crops	4	Aggregate	250

Points of Short Horn Bull.



The above plate is a representation of a Short Horn Bull with the points indicated upon it, so far as they can be so; and their numbers, names, descriptions, and values are given on the preceding page in single points with an aggregate of 250 marks.

SWINE.

By THOS. JONES, Manager, Warren State Farm.

This class of the domesticated animals of this country is fast becoming one of great importance to the community. The consumption of pork, fresh or salted; of bacon, dried or smoked; of hams, &c., is very great, rendering the improvement in the breeding, rearing, feeding, and management of pigs a matter of vast importance.

Pigs are indispensable to the farmer as a means of utilising as food the quantity of farm produce, refuse from the house, barn, garden, and field that would otherwise go to waste.

The chief points to be taken into account when selecting a pig are—Breadth of chest; depth of carcase; width of loin, chine, and ribs; compactness of form; docility, cheerfulness, and beauty of general appearance.

The head must not be too bony; the forehead should be rather narrow and convex; the cheeks full; the snout fine; the mouth small; the whole face rather short and straight to the crown, convexing upwards; the eye small and quick, but calm; the ears short, thin, ends sharp and pointing forward; and the whole appearance bright.

The neck should be full and broad, particularly on the upper part.

The shoulder should be broad and well joined to a broader back, which should be slightly curved. The ribs, loin, and rump are to be of uniform breadth, and the tail must not be too low nor too long.

The chest should be deep, broad, and prominent; the ribs well set, and spring well from the chine, the shoulders being widely extended; the thighs should be thick and the twist wide; the legs short, the bone fine, with small joints. Short feet, well fixed to the legs, are advantageous, as they enable

the animal to carry great weight. The hair should be long, thin, and fine, with few bristles; the tail the same; the skin thin, but without flabbiness; and, lastly, the colour should be uniform.

In selecting a breeding sow, care should be taken to see that she is likely to have a capacious belly and not too great an inclination to fatten. She must be free from defects, and possess at least twelve teats.

The boar and sow, at the age of about ten months, will be in a fair state for breeding purposes; if used much earlier, the sow becomes worn and feeble, and the boar is stunted in his growth, and soon shown signs of age.

Many sows become too fat during the period of gestation. This must be prevented by restricting their food, or by allowing them to breed more often.

When the sow is "in pig" she should have liberty to roam. A short time before farrowing she should be put in a convenient sty or pen, and fed on simple food, and her bed restricted to a small allowance of short straw, otherwise the young ones are in danger of being smothered in the straw, and then of being lain on by the sow.

The sow at this period requires warm food, containing bran or meal, and the young ones should be encouraged to feed with the dam. The latter may be weaned at eight or nine weeks old, and should then be fed often.

The plan of keeping store stock fed in sties may do very well on a small scale, but it cannot be profitably carried out on a large scale.

To increase the growth must be the first object, and this cannot be done without more exercise than a pig gets in a small sty.

In fattening pigs, the first thing is to provide them with a comfortable sty; the next, to feed them on simple, nutritious food. The pigsty should be roomy and airy, and be kept clean. Never let a young pig become stunted. Bear in mind the old saying: "Never let a pig lose his baby fat."

DESTROYING CHARLOCK.

Charlock *(Sinapis arvensis)* is a yellow-flowered annual closely allied to mustard, and is one of the worst weeds of arable land. Amongst the various remedies tried, the latest is calcium cyanamide. In a German publication ("Praktische Blätter für Pflanzenbau und Pflanzenschutz, Aug., 1909) an experiment with this remedy is described, which took place at Altenmarkt, in which two plots of oats were treated with a top dressing of calcium cyanamide on 8th May, 1909. Observations taken on 12th June showed that very little charlock was left on the manured plots, as compared with those unmanured, while the charlock on the unmanured plots was much stronger. A few days after manuring, the charlock had a burnt appearance, but the clover underneath, and peas which were sown among the oats, were not injured. The manured oats showed a rich, green colour. We have in former issues of the Journal (Vols. V., XII., and XIII.) published several articles on the methods adopted for the destruction of charlock by the use of solutions of copper sulphate and sulphate of iron, used as a spray, which proved highly successful.

At a recent meeting of the *Société Nationale d'Agriculture,* M. Hitier suggested that, on small holdings, where only a few acres have to be treated, the expense of carting water and of preparing and applying the solution may be obviated by the use of sulphate of iron in the form of a fine powder, broadcasted by hand, or by a machine, very early in the morning (say, 3 to 6 a.m.), when the dew is on the leaf. This had been found effectively to destroy charlock. Last year M. Hitier himself treated oats in this way, the charlock which it was desired to destroy being exceptionally abundant, and near the flowering stage. It was, however, completely destroyed. The amount of sulphate of iron used was 3 to 4 cwt. per acre. At the price paid for it, 3s. 3d. to 3s. 9d. per cwt., the treatment is no more economical than treatment with solution of sulphate and nitrate of copper, but it is held to be much more practical for the small holder, and even, perhaps, for the large farmer.

The Horse.

HORSES FOR THE ARMY.

One of the favourite assertions that we now hear constantly made is that, whilst we have been filling the country with Territorials, we are not seeking to provide them with the requisite supply of horses for cavalry and transport purposes. So writes Colonel H. Le Roy Lewis in the current issue of "Baily's Magazine of Sports and Pastimes."

In the United Kingdom there are slightly over 2,000,000 horses kept for agricultural purposes, together with mares for breeding, and unbroken horses; but we have no census of horses used for general purposes. An effort has, however, been made to take such a census in, at any rate, one county, and it may be well to give the brief details of this interesting experiment, made by Earl Fortescue for the county of Devon. The police of the county of Devon were asked to furnish lists showing all the horse-owners in the county, and it was found from their lists that the normal horse population was about 44,000, without counting breeding or unbroken horses or small ponies. With the lists furnished by the police, the Horse Classifying Committee of the County Association got to work, and the result of their investigation was that they found there were, in round numbers, 25,600 draught horses, 6,000 riding horses, and 2,800 pack horses in the county, or 34,400 suitable for military purposes. It will thus be seen that 10,000 out of the 44,000 originally reported by the police were rejected by the Classification Committee as unserviceable. No horses under four years were included, and no riding horses under 14 h. 2 in. Horses unsuitable for hard work on account of old age, lameness, or weakness were also excluded. Out of these 34,400 horses suitable for military purposes, 12 per cent. were fourteen years old, and 50 per cent. more than eight years old.

The general conclusion which Earl Fortescue draws from this Devonshire experiment is that "the number of horses available in the country for all military purposes is about equal to the number of agricultural horses in it." For in Devonshire there were 33,500 agricultural horses and about 10,500 non-agricultural ones, which together make up 44,000. Of this number, 34,000 were found to be suitable for military purposes, or very nearly the figure which exactly approximates to the number of agricultural horses in the county. If this deduction is a correct one—and Colonel Lewis sees no reason to doubt it—we should have available for military purposes close upon 2,000,000 horses in the United Kingdom. That figure is a very handsome one to juggle with, for a deduction of 50 per cent. can be made, and still leave us with 1,000,000 margin for the provision of our 120,000 horses which we need for military purposes.

One slight indication as to the number of horses fit for military purposes is to be found in the fact that we purchased during the South African War no less than 76,000 horses in this country alone, without very seriously disturbing the horse market. If we can make such a heavy draft on our horse population without materially affecting prices, there can be no doubt that we must have been dipping into a pretty large reservoir.

The only attempt we have made as yet to meet our requirements is in the registration scheme, which provides only about 20,000 horses. Still, it is not impossible, though perhaps improbable, that the 33,000 horses required for putting the Regular Army on war footing might be procured by more liberal registration methods. There seems to be no chance whatever of getting the 86,000 horses required for our Territorial Army by such means; and it is most necessary that some scheme should be devised whereby these latter horses may readily be made available.

In Switzerland the State is part-owner of a horse. It purchases a remount at three and a-half years old, and the soldier pays half the cost of the horse to the Government, together with the difference between its cost and the price the horse fetches at auction—for all horses are sold by auction to the men. After every year of training the Government refunds one-tenth of the original half-cost to the men, and at the end of ten years the horse becomes the absolute property of the soldier. In this manner the soldier is not always well mounted, but, as he keeps his horse with him at his home, his mobilisation problem is of the simplest nature. The average price of troop horses is about £45 sterling; and as most of these horses are imported from Ireland and North Germany, their price is considerably higher than it is likely to be in this country. Thus the State secures the services of a horse for an annual outlay of about £4 10s., but there are certain other expenses which must be included in this estimate, such as the cost of the establishment for remount depôts, &c., which raises the total cost of horses for the Swiss Government to about £8 12s. per annum.

It must not be forgotten that in 1908 we had some 30,000 horses in the Territorial camps, and that we paid £150,000 for the use of these horses. As far as mobilisation requirements go, this £150,000 was absolutely wasted, for we have no call whatever on the horses that attend Territorial camps.

Let us see how it would be possible to work out an economical Budget on the Swiss system, on the hypothesis that our Territorial Army is in full swing, and that we require some 80,000 horses annually for our Territorial camps. On the present system we should pay 80,000 times £5 for the use of these horses, or £400,000, which would be thrown out of the window as far as mobilisation is concerned. But if the Government were to purchase these horses outright and sell them at half-price again to willing purchasers, we should have to spend £2,000,000 in a lump sum. The interest on £2,000,000 at 3 per cent. amounts to £60,000 a year. About one-tenth of this 80,000 annually would have to be replaced, which, supposing we could purchase the horses at £40 each, would come to £320,000, and leave us £20,000 for contingencies. We should thus only spend the same amount—*i.e.*, £400,000 annually, as we would do were we to persevere in our present wasteful system; but instead of throwing £400,000 away we should have a call on 80,000 horses when mobilisation is ordered.

The system which is now outlined might possibly be slightly more expensive than our present one; but nothing more extravagant can be imagined than the distributing of an indefinite number of £5 notes merely for the hire of horses, when practically by the same expenditure of money we could secure a really valuable mobilisation result, together with all that we now have for training purposes, as naturally the horse sold by Government to the trooper would be available for all peace training as well as for mobilisation.

It may, of course, be argued that it would be impossible to house as many as 80,000 horses amongst the civilian population of these islands; but when we consider that of these 80,000 some 38,000 are required for draught purposes, the problem does not seem to be so insolvable, as farmers and tradesmen would be very willing to purchase useful draught horses at a cheap rate.

We have once made on a small scale an experiment of this description; at the end of the South African War we had some 3,000 riding horses available in this country over and above our military requirements, and these were offered to the Yeomanry regiments, free of all cost, it is true. The whole of these 3,000 were greedily absorbed; and I feel convinced that ten times that number could easily have been placed on the same terms.

The fact remains that if we cannot systematise the distribution of horses for military purposes, the whole of our Territorial force is comparatively useless. Therefore, we must face this important problem and find some solution for it. It certainly appears to me that the Swiss system gives us the best chance of meeting our requirements.

Then Colonel Lewis tells us that the Remount Department, in the financial year ended 31st March, 1909, actually spent £141,700 in the purchase of some 3,000 chargers, or an average of about £46 a head; and when it is considered that of these 3,000 chargers a large proportion were for officers and a certain number for the Household Cavalry, it can readily be understood that our troop horses are provided at a cost of about £40 a head. To anyone acquainted with our Regular cavalry, it will seem little short of miraculous that the excellent horses on which they are mounted can be provided for such a small sum of money; the Remount Department, far from deserving the strictures that are passed upon it, earn an annual vote of thanks from the Imperial Parliament for the efficient conduct of the business entrusted to their charge.

Whether we can arrive at any proper solution of this most important question or not is, says Colonel Le Roy Lewis, naturally open to some doubt; but that we must face it in the immediate future there can be no manner of doubt, for without horses our Regular and Territorial Armies are comparatively useless, and the whole of the large sums which we devote to our land defences is so much money wasted.—"Live Stock Journal."

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

Table Showing the Total Rainfall for each Month of the Year in the Agricultural Districts of Queensland.

Stations.	1909.											1910.	
	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
North.													
Bowen	4·52	1·06	1·15	2 32	1·98	1·23	0·13	0·21	0·36	3·15	19 98	15·45	7·10
Cairns	5·25	21·03	14 19	1·06	2 48	0 65	2·48	0·7	3·19	7·31	15·24	21 80	17·12
Geraldton	10·29	37·31	28 51	5·98	9·13	6·53	5·32	0·36	6·71	14·57	19·98	20 35	34·57
Gindie State Farm ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Herberton . ..	2·28	3·52	0·70	0·81	1·22	0·20	0·75	0·50	2·30	4·50	5·11	16·64	12·21
Hughenden	1·55	2·86	...	Nil	1·71	1·37	0·33	0·8	1·95	0·54	8·01	4·52	3·59
Kamerunga State Nurs.	3 52	...	4·95	0·97	...	...	...	...	...	...	...	...	...
Mackay	1·36	9·00	2·59	2·33	2·05	4·00	0·75	0·73	2·88	3·18	25·56	35·28	9·73
Rockhampton	2·01	1·68	1·21	0 03	1·33	2 99	1·37	1·20	2·16	4·55	2·74	11·93	1·28
Townsville	1·70	7·01	1·28	1·07	1·51	0 83	0·57	0·12	2·07	1·31	11·51	23·07	10·85
South.													
Biggenden State Farm	2·68	2·45	2·00	0·72	2·60	4·01	1·78	0·29	...	2·83	6·96	7·22	3·99
Brisbane	2·72	2·65	4·67	0·82	1·75	2·10	2·44	2·74	1·56	4·14	6·45	7·24	4·19
Bundaberg	3·70	5·06	1·54	0·67	1·51	5·65	1·66	0·98	0·42	3·55	2·99	11·81	2·43
Dalby	3 55	0·99	1·60	Nil	1·87	1·19	3·13	0·47	1·92	2·13	2·45	10 88	1·33
Esk	3·21	3·27	5·03	0·36	2·43	2·74	3·31	2·60	2·61	2 69	9·20	8 60	1·94
Gatton Agric. College	5·00	3·18	3·82	0 32	1·22	2·02	2·09	2·29	1·87	...	3 92	11 79	...
Gympie	3·77	3·41	2·34	1 15	2·96	4·70	2·80	1·70	2·30	3·82	16 54	5·92	3·48
Ipswich	1·95	2·66	4·56	0·05	1·31	1·67	1·34	3·55	1·93	1·56	4·72	6·91	2·78
Maryborough	7·11	2 28	2·4	0 91	2·57	5·02	2 53	1·56	0·51	3.94	6·83	5·65	2·99
Roma	4·85	4·18	1·91	0 44	2·73	1·54	4·83	0·12	0 90	2·12	1·05	4·74	1·47
Roma State Farm ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tewantin	3·31	4·34	9·37	1·00	3·24	4 08	4·24	1·38	3·82	1·90	8 85	5·96	3·42
Warwick	0 82	1·30	2·21	0·70	1·23	2·04	2·28	1·77	2·85	2·77	4·25	3·93	3·14
Wellington Point ...	...	...	...	...	...	...	...	...	...	...	9·00	...	...
Westbrook State Farm	2·61	1·43	...	...	...	...	...	...	...	...	...	...	...
Yandina ..	6·12	3·71	5·25	1·10	2·70	3·70	5·81	3·84	2·30	0 76	20·18	6·71	2·07

Note.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND,
Divisional Officer.

The Orchard.

QUEENSLAND BANANAS.

If any evidence were wanted to show that Southern Queensland can produce bananas equal, and indeed, superior, to any which are grown in the West Indies, Fiji, and other tropical countries, that evidence is supplied by a grower at Mount Cotton, Mr. Preston. Mount Cotton is situated a short distance from Cleveland, and has for many years been noted for the richness of the scrub soil, and for a climate eminently suitable to the growth of sugar-cane, citrus fruits, bananas, &c. It has not been found necessary as yet to supply any manure to the banana groves, which is a proof of the fertility of the soil, bananas being somewhat of an exhaustive crop. A few years ago we received from Mr. Court, of Mooloolah, a sample of bananas of the Cavendish variety, of exceptionally large size, and of excellent flavour. The fruit grown by Mr. Preston appears to be identical with that grown by Mr. Court, although all the fruit experts and fruit salesmen concur in the statement that for the past twenty years no such magnificent bananas have been placed on the market in Brisbane, or anywhere else in Queensland.

The accompanying illustration will give some idea of the beauty of the fruit, although the bunches should be seen to be fully appreciated. The Fijian bananas which we have seen in the Southern markets are, to use an ordinary expression, not in it with those which were to be seen at the Turbot-street mart of Mr. A. S. Barr, Mr. Preston's agent.

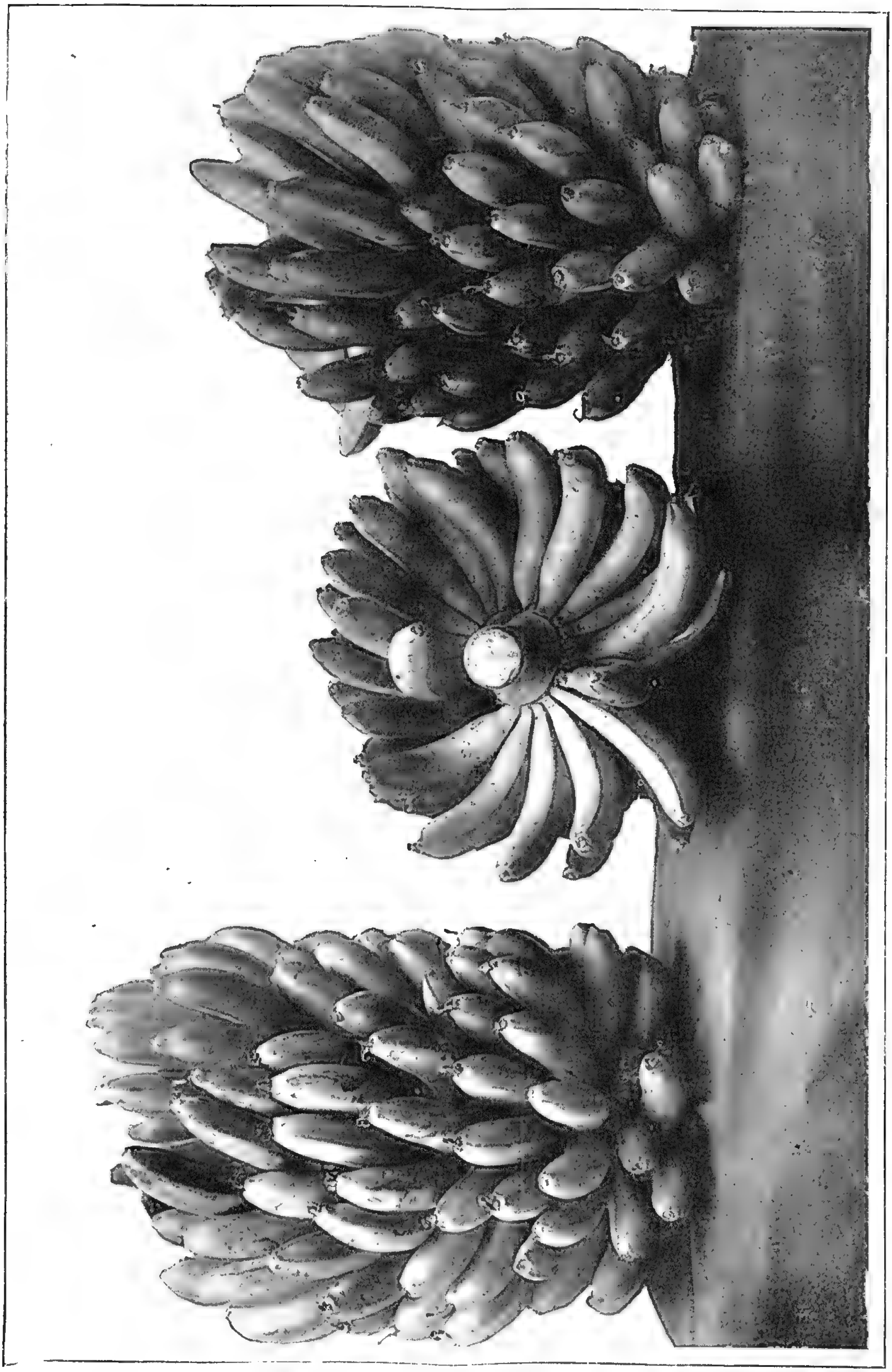
Every banana on a bunch is practically of the same size, and well filled. One of the bunches containing 11½ dozens, weighed 67 lb., and these were sold wholesale at the exceptional price of 8d. per doz. Others sold at 6d. per dozen wholesale.

Out of a recent shipment of Fiji bananas to the Brisbane market, the bunches weighed, on an average, 50 lb., the bunches containing from 15 to 18 dozens. Thus Mr. Preston's bananas weighed 7.7 oz. each, or nearly ½ lb. The Fijian bananas weighed respectively 4.4 oz. and 3.7 oz. In addition to its size, the fruit is of excellent flavour.

DRESSING SEEDS AS A PROTECTION AGAINST BIRDS.

Experiments have been conducted by the German Imperial Biological Institute with a view to ascertain the degree to which seed can be protected from the attacks of birds, particularly rooks or crows, by dressing it so as to give it an unusual colour or an objectionable taste or smell. The colours used were blue, red, and green, in the following proportions:—For every 100 parts of seed, 0·2 parts of glue dissolved in 8 parts of water, with 2·0 parts of red colour, or from 0·5 to 1·0 part of Prussian blue, or 0·4 part of aniline green. The colour dressing did not affect the germinating capacity of the seed. Exhaustive experiments with starving rooks showed that when let loose on the sown beds they ate 3 grammes of seed prepared with Prussian blue, 35 of that treated with red colour, 8 of that treated with green, and 68 grammes of undressed seed. Dressing with blue was shown to be most effective, and the experiments showed that rooks are influenced in their search for food by colour, smell, and taste. For the two latter experiments powdered aloes 0·6 parts with 8 parts of water to 100 parts seed, and creolin a 3 per cent. solution in 8 parts of water per 100 lb. of seed were used. The birds shunned the creolin and aloes.

Plate X.



Mount Cotton Bananas Grown by Mr. Preston.

Poultry.

THE HOUDAN.

The Houdan in its pure state is a very desirable utility fowl. But excellent as is the pure breed, it is of greater value still to utility poultry-keepers for crossing purposes.

It stands quite unique among all other breeds in this respect, giving excellent results if crossed with any other variety.

Houdans are hardy, quick growers, and easy to rear. If carefully bred, they will lay well both in summer and winter. They make excellent table birds, and are not given to broodiness. In short, they are good all-round fowls. For cross-breeding, whether for egg production or table qualities, the Houdan is most useful. The produce from a cross with the Leghorn is one of the finest crosses for laying that exists. When crossed with the Buff Orpington an all-round fowl is produced which is quite equal to any other, if not better.

Cross-bred Houdans cannot be beaten for quick growth, the cockerels being large enough to kill at an early age if well handled. For improving farmyard stock no better breed could be employed than the Houdan.

Houdan males are very active, good breeders, and eggs can be relied upon for fertility if the birds are healthy, well developed, and strong.

When Houdan males are required for cross breeding they should be from a strain specially bred for utility qualities, and not an exhibition strain.

This point is important, as there are strains bred for both purposes, utility and exhibition. The utility Houdan has not the ponderous headgear which characterises the show specimen, nor is it desirable that it should have.

As a breed of sterling worth for purposes of utility, it is regrettable that the Houdan is not more largely kept than it is.

For crossing purposes it has no equal, and no one will have cause to regret giving the Houdan a trial.

HOW MEXICANS TEST EGGS.

It is a common sight in the plaza in a Mexican town, says an exchange, to behold a stall-woman who is selling two reals' worth of eggs, pick them up one by one, put one end and then the other to her lips, and hand them over to the customer, who repeats the same identical operation. To the inexperienced onlooker it seems as if they were tasting the extremities of the eggs. As a matter of fact, they never touch the egg with their tongue. The idea of the performance is that when an egg is fresh one end is distinctly colder than the other. The end which has the air chamber is the warmer of the two. The human lips are exceedingly sensitive to heat and cold, and even the novice at that form of egg-testing promptly becomes a capable judge. If both ends of the egg reveal the same temperature, that egg may be counted as bad, as it is a fairly good sign that the air chamber is broken and the contents spread equally within the shell.

Tropical Industries.

A NEW SUBSTITUTE FOR COTTON.

The reader will say that there is nothing new in the fibrous material known as kapok, seeing that it is universally used in upholstering furniture and in stuffing pillows, mattresses, &c.; but it has remained for one of the largest factory towns in Saxony to introduce a new invention which will doubtless (says "The Scientific American," 18th December, 1909), cause considerable changes in the price of cotton, and which, furthermore, will be of interest and importance to our readers in kapok-growing countries.

For some considerable time past the German textile world has been devoting unflagging attention to the discovery of fibrous plants which might, in any way, be rendered available as a substitute for cotton, and great interest has been given to the more or less successful experiments made. Trials made with ramie and Caravonica cotton have been fairly successful, but have not met with that meed of success, nor attracted so much attention, which has fallen to the share of the experiments made with the fibre of the kapok-tree (the so-called "silk-wood tree"), which flourishes in America, Asia, and Africa (and also in New Guinea). The fruit of this tree contains a seed which, like that of the cotton plant, is enveloped in short, silky hairs. These hairs, however, are so short that they have hitherto been useless to cotton-spinners, and have been used chiefly for upholstery and mattress-making purposes. Most kapok-trees grow wild, and only recently have a few Europeans begun to cultivate them systematically in New Guinea and East Africa. Steps are also being taken to grow these trees properly in the German Protectorate.

This new industry will be greatly favoured by the process just discovered by the proprietors of a large German spinning mill, whereby it is now possible to render kapok fibre easily spinnable. So far, as a matter of absolute fact, the veritable fibre of the kapok-tree has not been dealt with, but only the fibres of *Calotropis procera* (a plant growing wild in East Africa); however, it is exactly the same as kapok fibre in character, appearance, and qualities. Hence, if the one can be spun, so can the other—a point on which not the slightest doubt is entertained. By means of a process evolved by Professor Goldberg, of Chemnitz, the brittle and fragile fibre of the kapok-tree is treated in such a way as to render it easily spinnable, and yarn up to 12 English is now being spun from it. A sample, both of the raw material and yarn, is to be seen at the offices of the mill. The yarn is of fine quality, and of a very soft, silky, and tenacious character. The process in question does not necessitate the employment of any new machinery, but is based entirely on a novel and somewhat complicated system of preliminary preparation and spinning. What the actual process is cannot yet be divulged.

In the German African colonies fibre stuffs of all kinds are now being grown, and, as Dr. Hindorf recently pointed out in a report to the Kolonial-Wirthschaftliche Komité, the new plantations of sisal in German East Africa have now attained such dimensions that in a few years' time the annual output will exceed 10,000 tons, and Germany will be able to meet her own requirements. Togo appears highly suitable for the cultivation of sisal, and trial plantations are also being laid down there. Kapok is also grown in German East Africa, and the exports thence to Germany are steadily increasing. . . The whole aim of the German is to become "independent," and, as far as possible, to do without foreign goods and foreign labour.

Kapok, sisal, and cotton thrive well in Queensland, but the high wages demanded by the white labourer are such a serious handicap that it will probably pay the Australian manufacturer to import the raw material produced by cheap black labour than to encourage agricultural enterprise in this direction in any of the States of the Commonwealth.

A FRENCH VIEW OF RUBBER.

By A FRANCO-AFRICAN AUTHORITY.

Plantation Rubber Must Dominate the Position.

The "Tropical Agriculturist," Ceylon, publishes the following from the "Financier":—

[In a recent interview with the representative of a Paris contemporary Mr. Engeringh, who is the administrator Delegate of the Sultanats du Haut-Oubanghi (French Congo) gave expression to some very interesting opinions as to the present position of the rubber industry and the future of plantation rubber. Mr. Engeringh, we need scarcely add, from the position he holds is exceptionally well placed to offer an opinion on the subject. He is connected with several rubber plantations, but prior to acquiring these interests he was for a long time head of some of the principal Congo Companies. With his experience, then, of both "wild" and cultivated rubber his views on the outlook should prove of interest to our readers.—Ed. "F."]

"What strikes me most in the present position of rubber," said Mr. Engeringh, in reply to the obvious question of his interviewer, "is that, in addition to the increase in the consumption of the commodity reflected in the high prices now ruling, there is a quasi-certainty of a slow but very decided movement on the part of the main rubber cultivation to migrate. South America has been up to the present, and still is, the great rubber-producer. The share of the Congo is not insignificant, but it is negligible, amounting to 5,000 to 6,000 tons a year, compared with, roughly, 40,000 tons from South America. Therefore, it is to South America that we must turn our attention if we would study the production of forest rubber and the gathering thereof. Well, it appears to me that this harvest of the forest is not likely to increase. Without seeking to bring out technical reasons (which are, however, of themselves very weighty), I will confine myself to naming this one fact, which appears to me to be the most tangible proof.

Stationary South American Output.

"In spite of the great rise that the prices of rubber experienced for two years—which should have been a great stimulant to the producers, as it assured them of large profits—statistics demonstrate conclusively that the production in the regions named has remained stationary. Let us take the four past months—1st July to 31st October, 1909—that is to say, the time when rubber reached its highest price. The production in that period in the Government of Pará reached the level of 8,560 tons. During the corresponding period of 1907, when the price was 3s. less per lb., the production was 8,480 tons—that is to say, practically the same as this year. It is obvious, then, that if more is not produced at this time, it is because it cannot be done. The temptation is strong enough. The Government of Pará, on the other hand, is getting alarmed at the extravagant production, which, it is feared, will reduce the subsequent producing capacity of the country. It is endeavouring to stop the excessive tapping of the *lianes* [*sic.* This term is usually applied to rubber *creepers* and not to the *Hevea* trees of Pará.—A. M. & J. F.] and so to protect the future.

"From the fact that this production does not appear to grow, but rather to maintain itself with considerable difficulty—and there is, besides, the question of labour, which is always rare and difficult to obtain in South America, and is in many parts a very disquieting problem—it is clear that the consumption, which continues to grow, must turn elsewhere for satisfaction. On the other hand, it is natural that the progress of consumption is much less than it would be because of the high prices quoted, which prevent the employment of rubber in many industries. In my opinion it would be a great advantage if the price of rubber fell to about 15 f. per kilogramme (5s. 5d. per lb.). At this price the profits of the producers, particularly in the plantations, would be enormous, and the market would be unlimited. When the price of rubber is more approachable, the consumption will receive such an impetus that we may be able to count on, I believe, an annual increase of 10 per cent. Even if we only estimate the advance at 5 per cent. per annum, we would have an

increase of 50 per cent. in ten years, which is not exaggerated. Everybody knows that the uses to which rubber is put are increasing in number constantly." Here Mr. Engeringh quotes a number of applications of rubber, actual and prospective, and proceeds:—"I am convinced that the consumption of rubber will make enormous progress, and what is not obtained from the exploitation of the forest reserves of South America will be provided by the rubber plantations. There is where its future lies, and thus I am able to tell you that its centre is going to change its geopraphical position."

"SYNTHETIC" RUBBER.

"Have we anything to fear from the competition of 'synthetic' rubber?" asked the interviewer.

"No; I do not believe in it at all," said Mr. Engeringh, "and I am not alone in my opinion. This is also the opinion of M. van Romburg, Professor of Organic Chemistry in the University of Utrecht, formerly Director of the Botanical Gardens of Batavia. All efforts in this direction by chemists have been hitherto fruitless. Materials will probably be found that will answer the description of impermeableness, and may compete feebly with rubber, but their influence will be insignificant. As to finding a product that will possess the same qualities as rubber, with its essential characteristic elasticity, that appears to be but a Utopian idea."

MIDDLE EAST PLANTATIONS.

"Plantations will increase," continued Mr. Engeringh, in reply to a further query, "but numbers of them will be disappointing." Proceeding to outline the conditions required for their success, he found that the Middle East presents ideal conditions for rubber cultivation, and—an important point—there is plenty of labour there. The population in many parts are already agricultural and industrious, and quite adapted to plantation work. Furthermore, labour there is cheap. He then recounts the progress of the plantations up to the present (which part of his narrative we need not reproduce) and observes that the cost of production is naturally very varied. But the price of rubber is so high compared with production costs that the disparity explains the large dividends already paid by some Middle East companies almost as soon as they started to market the product."

The interviewer made inquiries as to Mr. Engeringh's opinion of the standard of value.

"Will Pará," he asked, "always be the standard for plantation rubber?"

"On the contrary," said Mr. Engeringh, "there is generally a margin in price in favour of plantation rubber, as it is purer. In any case, the better grades are never sold cheaper than Pará."

"In such case," continued the interviewer, "the plantation investment appears to be so inviting that more will be started, so there might easily be a danger of over-production?"

"Up till now there is nothing to fear," replied Mr. Engeringh. "Stocks do not grow, and, as a matter of fact, the Middle East plantations are at present supplying a very small quantity compared with the world's total. But, allowing for a rapid increase, this will only provide for the growing consumption, and it will no doubt be easily absorbed."

Our authority does not believe that the forest production will remain at its present level, but that, on the contrary, it will decrease, which tendency it is clearly showing, with the exception of certain regions—for example, the Congo, where both the French and Belgian Governments have made wise provisions in the concessions as to the replanting of the rubber areas as they are used up. This will no doubt ensure the maintenance of the level of production in Africa. But it is not so in South America, where the tendency to fall off in the production is very significant.

THE FUTURE OF THE MIDDLE EAST.

"But, again, as to the indefinite increase of the plantations in the Middle East, that," said Mr. Engeringh, "is impossible. They require special clearly-defined conditions for their success, and these conditions will only be found in a limited number of areas. The best lands are already taken. The existing plantations that have reached, or very nearly reached, the production stage may be called privileged. They have not any serious competition to fear, and, in spite of the efforts made to increase their yield, they will do no more than meet the demand that is growing so wonderfully. I do not believe there is any cause to anticipate an accumulation of stocks. I believe present prices will be maintained, and, if the present growth in the demand, estimated at the moderate rate of 50 per cent. in ten years, continues, the plantations which have yielded 2,500 tons last year will have to give us 35,000 tons in ten years. Those who like to juggle with figures will no doubt be able to show that in ten years their yield will be 70,000 tons. But allow me, as a man understanding the business, to doubt it. Remember what I told you—that rubber requires special conditions; besides, we must take into account with the rubber plantations the usual mistakes that occur on the average with industrial enterprises. The liability of humanity to err must be taken into account. In fact, we must reconstitute methodically the accumulation that Nature has taken many years to perfect in the immense forests that are now being exploited. That will take time. . . . One thing is certain; the future of the rubber plantations is assured for a long time, and the centre of production is being gradually shifted towards them."

PROSPECTS OF RUBBER-GROWING IN QUEENSLAND.

When it has been suggested to capitalists who propose to invest largely in rubber-growing, that North Queensland offers a profitable field for investment, the reply has been: "How can Queensland, with its labour conditions, high rate of wages, and imminence of strikes at critical periods, attempt to compete with countries where there is an abundant supply of cheap black labour, where rations are cheap, and strikes unknown, and where rubber lands can be obtained for a mere nominal rent, as in New Guinea?" At first sight, this argument would appear unanswerable; but, when we come to figure the matter out, it can be shown that rubber-growing under white labour conditions in Queensland would be almost as profitable as in black labour countries.

Let us assume that wages in, say, New Guinea, amount to 10s. per month, and rations to another 10s., with an additional £3 per man, recruiter's fee, and that in Queensland a man's wages are £7 per month, and rations £1 4s. per month. The total expenditure on a plantation of 500 acres in Papua to the end of the sixth year is roughly £10,500, or £21 per acre. In the Malay Peninsula it amounts to £14,152, or £28 per acre. In Queensland the total expenditure to the end of the sixth year will amount to £33,872; or, roughly, £67 15s. per acre, which is about one-fourth more than what it costs per acre to open up a pineapple plantation on new land in Queensland, according to Mr. A. H. Benson, Instructor in Fruit Culture. This is assuming that new, uncleared land has to be dealt with. When land already cleared and fit for the plough is planted, then the cost of labour is materially lessened.

The price of Crown land in Queensland suitable for rubber-growing varies from £640 per square mile, with a survey fee of £14 4s., or a total of £654 4s., extended over a period of twenty years, without interest, to £2,560 per square mile plus survey fee, as above. Another cause of expense is the necessity for fencing in a plantation in this State, whilst this is not needed in New Guinea.

The following is an estimate of the cost of planting 500 acres with Pará rubber in Queensland, and of the total expenditure to the end of the sixth

year, when the trees may be tapped. An estimate of the returns at the end of the sixth and seventh years is also appended:—

ESTIMATE OF COST OF PLANTING 500 ACRES OF RUBBER IN QUEENSLAND, AND OF UPKEEP FOR SIX YEARS.

	£	s.	d.
Cost of 640 acres, uncleared Crown land, at £1 per acre ...	640	0	0
Survey fee	14	4	0
Clearing—*i.e.*, felling and burning off—500 acres, at £4 5s. per acre	2,125	0	0
Lining, holing, and planting, at £2 10s. per acre	1,250	0	0
Pará rubber plants, 75,000, at 3d. each	937	10	0
(or seeds at 1s. per doz., £416 13s. 4d.)			
Upkeep—			
Wages: 50 men, at £1 15s. per week, for four years; rations, at £1 4s. per month per man for four years	21,320	0	0
Wages and rations: 30 men for two years, at same rate ...	6,396	0	0
Overseer	250	0	0
Implements (hoes, axes, grubbers, &c.)...	50	0	0
Buildings for overseer and men...	400	0	0
Fencing 640 acres, at £60 per mile	240	0	0
Contingencies, say	250	0	0
	£33,872	14	0

At first sight this seems to be a very large outlay, but it is not so much by many thousands as has been laid out on many Queensland sugar plantations, where the cost of a big mill has to be incurred after all expenses of clearing, cultivation, tram lines, &c., have been paid, and where 300 or 400 men are employed at crushing time. At Messrs. Gibson and Howe's plantation, "Bingera," Bundaberg, the irrigation plant alone cost £40,000, and, in addition, there is probably the biggest and most up-to-date sugar mill in the State, not to speak of 100 horses at work daily. Yet the estate pays the owners handsomely.

The next thing to consider is—

"WHAT ARE THE RETURNS IN THE SHAPE OF RUBBER ON A 500-ACRE PLANTATION?"

In the sixth year the trees are ready for tapping. How much dry rubber will the 75,000 trees yield? What does it cost to collect and prepare it? What is the gross cash return?

The trees on first tapping should yield from ¾ lb. to 1 lb. of dry rubber per tree. For convenience of calculations, let us say that they yield 1 lb. of rubber, and that the price is 5s. per lb.

We have 75,000 lb. of rubber, value	£18,750	
Cost of collecting, &c., at 1s. per lb.	3,750	
	£15,000	
Net return, from which cases, freight, &c., must be deducted. The debit balance at the end of the 6th year is		£18,872
The tapping at the end of the 7th year will yield, say, 2 lb. of rubber per tree, or a total of 150,000 lb. at 5s.	£37,500	
Cost of collecting, at 1s. per lb.	7,500	
	£30,000	
Less debit from previous year	18,872	
Net return, less freight, cases, &c.		£11,128

In the 8th and following years the trees should yield at the rate of at least 3 lb. of dry rubber per tree, or 225,000 lb. at 5s. per lb.	£56,250
Cost of collecting, at 1s. per lb.	11,250
Net return, less cost of cases, freight, &c. ...	£45,000

There will, of course, be many contingencies and unforeseen expenses to be provided for, such as, possibly, the cost and upkeep of a steam launch or cutter and whale-boat, renewal of tools, repairs, &c., whilst the manager's and overseer's salaries still go on, the wages of the labourers being included in the cost of collecting. Taking all this into consideration, there remains a profit which has never been obtained from any other agricultural industry under the sun.

So much for the possibilities of rubber-growing for wealthy companies. Let us now see

How Rubber-growing on Small Areas Will Pay.

There are in North Queensland areas of land which, although planted with sugar-cane, have been abandoned as sugar plantations, under the impression that sugar-growing was doomed to extinction after the withdrawal of black labour.

I will suppose that such a large estate as that of a well-known firm of planters on the Herbert River in North Queensland, instead of being sold as offered, in one block, were to be cut up into 80-acre farms, and that on each farm 40 acres are already planted with cane and 40 are cleared, but unplanted, or out of crop. Furthermore, I put the price of the land at the extreme value of £20 per acre, payment extending over twenty years, with interest on the unpaid balance at the rate of 5 per cent. per annum. Now, we must ask: Can a cane-farmer live on the produce of 40 acres of cane when there is a sugar-mill in his neighbourhood? Outside an irrigation area, a yield of 20 tons of cane may be looked for in an ordinarily good season on good land. Thus, 40 acres of uniformly-grown cane would produce 800 tons of cane, worth at the mill, with the bounty, £1 per ton. Deduct 4s. per ton for cutting and loading, and the result is £640. But the cane must be cultivated and kept clean every year for at least three months, after which it has possession of the ground, and further cultivation is impossible and not needed. Say the cultivation costs him £100, and one-twentieth of the purchase money with the annual interest amount to £160. He has then £380 per annum, on which he can live fairly well and pay for labour to plant 20 acres of the fallow land with rubber. How this is to be done and at what cost is shown in the following estimate, allowing 150 Pará rubber trees to an acre:—

Estimate of Expenditure and Returns of 20 acres of Rubber in Queensland.

The land is supposed to be cleared, stumped, and fit for the plough, the purchasing price £20 per acre, and the payments extend over twenty years, at 5 per cent. per annum on the outstanding balance, no payment being made until end of 1st year.

1st Year.	£ s. d.	£ s. d.
$\frac{1}{20}$ of principal (£400)	20 0 0	
Interest at 5 per cent. on £400	20 0 0	
3,000 plants at 3d. each	37 10 0	
Planting 20 acres at £1 10s. per acre	30 0 0	
Cultivation at £2 per acre per annum	40 0 0	
		147 10 0

	£ s. d.	£ s. d.
2nd Year.		
$\frac{1}{20}$ of principal	20 0 0	
Interest at 5 per cent. on £380	19 0 0	
Cultivation at £2 per acre	40 0 0	
		79 0 0
3rd Year.		
$\frac{1}{20}$ of principal	20 0 0	
Interest at 5 per cent. on £360	18 0 0	
Cultivation at £2 per acre	40 0 0	
		78 0 0
4th Year.		
$\frac{1}{20}$ of principal	20 0 0	
Interest at 5 per cent. on £340	17 0 0	
Cultivation at £1 per acre	20 0 0	
		57 0 0
5th Year.		
$\frac{1}{20}$ of principal	20 0 0	
Interest at 5 per cent. on £320	16 0 0	
No cultivation	...	
		36 0 0
6th Year.		
$\frac{1}{20}$ of principal	20 0 0	
Interest at 5 per cent. on £300	15 0 0	
No cultivation	...	
		35 0 0
Total expenditure at end of 6th Year		£432 10 0

NOTE.—During these 6 years, given good seasons, the income from the sugar-cane will have supplied the means for carrying on the rubber plantation, and for part payment of the cost of the land as well as the yearly interest.

Returns at end of 6th and Subsequent Years.

The trees now ready for tapping should yield 1 lb. of dry rubber per tree.

	£ s. d.	£ s. d.
Yield of 3,000 trees at 1 lb. rubber per tree, 3,000 lb. at 5s. per lb.	...	750 0 0
Cost of collecting and preparing, 1s. per lb	150 0 0	
Cases, freight, &c., say	2 10 0	
		152 10 0
		£597 10 0
Less expenditure during six years		432 10 0
Net profit in 6th Year		£165 0 0

		£ s. d.	£ s. d.
7th Year.			
$\frac{1}{20}$ of principal	£20 0 0		
Interest at 5 per cent. on £280 ...	14 0 0		
		34 0 0	
6,000 lb. rubber at 2 lb. per tree, at 5s. per lb. ...		...	1,500 0 0
Cost of collecting at 1s. per lb.		300 0 0	
Cases, freight, &c., say		5 0 0	
			339 0 0
Net profit in 7th Year			£1,161 0 0

In subsequent years the trees will yield from 3 lb. to even more per tree, and no further cultivation is required. For example:—

8th Year.		£ s. d.	£ s. d.
$\frac{1}{20}$ of principal	£20 0 0		
Interest at 5 per cent. on £260 ...	13 0 0		
		33 0 0	
At 3 lb. rubber per tree, 9,000 lb. at 5s. per lb. ...		...	2,250 0 0
Cost of collecting, at 1s. per lb.		450 0 0	
Cases, freight, &c., say		7 10 0	
			490 10 0
Net profit at end of 8th Year*			£1,759 10 0

The Queensland rubber-grower would by this time have paid for the land (80 acres), and would probably have planted up the remaining 20 acres. Meanwhile the sugar plantation will have kept him in comfortable circumstances, and enabled him in addition to establish his little rubber plantation without getting into debt.

Even if rubber fell to 3s. per lb., the prospect of the rubber planter in Queensland with white labour is such as to be an inducement to young cane farmers to engage in the industry. In compiling the above estimates, the writer has drawn upon actual results of rubber plantations in the Federated Malay States, Brazil, and Ceylon, and from his personal experience of the cost of opening up large rubber estates in New Guinea. As regards profits, although these appear incredible, yet they are proved by the dividends paid by rubber companies, as shown in the rubber market report following, and by the prices paid for their shares.

In the estimated sales of rubber in the above returns, the price has been given at 5s. per lb., but it will be seen that the prices quoted in the rubber market in February, 1910, for Pará rubber ranged from 7s. 5d. to 7s. 7½d.; in September, October, and November, 1909, prices rose to as much as 8s. 3d. and 9s. 8½d. per lb., which was the highest for the year, and in March, 1910, the price rose to 10s. 6d. per lb. The "Colonial Office Journal" of July, 1909, says concerning rubber-growing:—

Mr. John Ferguson, in his admirable paper read before the Royal Society of Arts, prophesied that the rubber crops in Ceylon would in five years hence yield £3,000,000 yearly. Some remarkable results are being achieved, and not the least satisfactory feature is that a small area and moderate capital can give excellent returns. One company, with an issued capital of £6,000, possessing only 20 acres in bearing and 26 of young rubber, has in its second year paid a dividend of 21 per cent. An individual planter in the Perak district, holding 100 acres, netted an income in 1907 of £3,500. Single trees have given in a few years 12 to 20 lb. of rubber, worth 5s. per lb., and small areas have given returns equal to more than £60 per acre profit in one year. The average figures are, of course, much less, but there can be little doubt that such land as that in Malaya, yielding mature rubber, gives the highest financial results of any agricultural land in the world.

THE RUBBER MARKET.

Whilst other countries are straining every nerve to open up new rubber plantations, Queensland, with her splendid tropical soils, with the abundant rain fall, and tropical climate in the North, still remains apathetic, and allows other countries, notably the newly exploited New Guinea, to get ahead of her in the production of this valuable article. We can truthfully say from personal

* In both the above estimates I have taken 5s. per lb. as the market price of rubber. At this moment the price is 10s. 6d. per lb., with every probability of a further rise. Lower prices may rule in the future, and the planter's profits will, in such a case, be less than here shown, but even at 3s. per lb. the industry cannot but prove remunerative.

experience of both countries that large areas of the lands of North Queensland, from Mackay to Cairns, are as well adapted climatically and meteorologically to rubber-growing as those of New Guinea, yet scarcely anything is done in this direction. Doubtless many would open up plantations were it not for the great cost of labour in Queensland as compared with black-labour countries. But if people who have the means, or if wealthy companies would study the rubber market, they would discover that the wages question is not such a great bogey after all.

Looking over the report on the rubber market issued in London by Messrs. Figgis and Co., for January last, which was published in "Tropical Life" (January, 1910), we note the following remarks:—

Plantation Rubber.—Planters should be amply satisfied with anything near the present rates, which are 2s. 5d. per lb. above last January. The highest price in 1909, or any other year, was paid in November—9s. 8½d. for fine *smoked* sheet.

Smoked rubber appears to have greater resiliency and to be more suitable for many purposes than unsmoked. "Smoking" prevents the "proteins" in rubber from decomposition, and generally from "tackiness." All fine rubber from Pará is smoked. During the excitement well-smoked sheet realised 6d. per lb. above good unsmoked. Of course, such a great difference will not be obtainable when the proportion of smoked is larger.

Plantation Shipments to Date.

	1909.	1908.	1907.	1906.	1905.	
Exported from Ceylon (and India) ...	600	350	230	160	70	tons.
,, Malaya, &c.	3,000	1,450	780	350	75	,,
	3,600	1,800	1,010	510	145	,,

The improvement in quality we noticed in our last annual review has continued, and we congratulate planters on the large proportion of clean crêpe of nice colour, and the very small quantity of "tacky" rubber. This shows how profitable it has been for planters to wash and clean the rubber thoroughly, and to prepare as large a proportion as possible of good colour—also not to send many qualities or very small lots. Block has not been in favour; unless clean, resilient, hard quality can be sent, it may be better to ship as crêpe or sheet.

Pack your rubber in good dry condition (excess of resin much objected to) into strong cases of 2 cwt. to 3 cwt. each. No paper, Fuller's earth, &c., to be used. The cases should be planed smooth inside* to avoid small pieces of wood adhering to the rubber. Keep the different qualities and colours separate. Where practicable keep immature lots separate. Send dirty, barky pieces separately. Wash out all the bark in crêpe, block, and sheet. All fine qualities should be loose—crêpe, sheet, or biscuit—not run to a mass.

Last January good sheet realised 5s. 1¼d. to 5s. 3d., pale crêpe 5s. 4½d.; by May 5s. 9d. to 5s. 10d., June 6s. 7d., July 8s. 2d. to 8s. 3½d., August (irregular) 7s. 10d. to 7s. 3d., and up in September-October to 9s. 1½d., and smoked 9s. 8½d. early in November, the highest of the year. With larger supplies of Pará in December prices declined 2s., to 6s. 11½d. to 7s. 1½d. sheet and crêpe, but since recovered, sheet to 7s. 3d. to 7s. 5d., fine crêpe 7s. 6½d., smoked sheet 8s. 0¼d. to 8s. 0¾d.; these are the closing prices. Good supplies landing for auctions in January.

Now that the quantities are increasing so rapidly, it is most desirable for the future ready sale of plantation rubbers for estates to "satndardise" the qualities they produce, and where practicable to ship, say, three qualities from an estate, No. 1 pale, No. 2 light-brown and grey, No. 3 dark and brown. Pickings and very common and scrap to be sent in one bulk for sale on arrival;

* Like the Venesta boxes, "the question of packing has received more attention during the latter part of the year," writes Messrs. Wilson, Smithett and Co. in their Annual Report, "and we would again point out the necessity of having an absolutely smooth interior to the cases, otherwise splinters of wood are liable to become driven into the rubber, and manufacturers experience great difficulty in extracting the pieces. No paper or other lining should be introduced.—ED. "T.L."

"standardised" qualities can be sold for forward deliveries, the same as Pará has been sold for many years. Plantation must be largely sold "forward" in future years.

The unlooked-for, extravagant, and unprecedentedly high prices obtained from July to October were due to the great extension of "motors," cars, cabs, &c., particularly in America, where enormous contracts for "tyres" created an increased consumption of rubber. At present this goes on, but the speculative deals, which left so many "Bears" to be covered (at a loss), are reduced.

The Brazil supply has increased, both from the Amazonas and Manicoba, Mangabeira, &c. The production of reclaimed and common substitutes for rubber has increased, but no "synthetic" has appeared to stay as yet. We have had some fine lots of Rambong in nice condition, principally from Sumatra, and realised high prices. Castilloa was indifferent in quality.

The world's supply of all kinds in 1909 was about 69,000 tons, against 65,000 tons in 1908 and 69,000 tons in 1907. Consumption, we estimate, was about 68,000 tons.

Of rubber planted we estimate in the East nearly 600,000 acres:—

	1909.	1908.	1907.
Ceylon	187,000	180,000	150,000
Malaya, Malacca, &c. ... ... (Containing about 21,000,000 trees, not 3,000,000 tapped in 1909.)	240,000	185,000	100,000
Borneo	10,000	10,000	9,000
Dutch East Indies (70,000 Java) (50,000 Sumatra), &c.	120,000	90,000	70,000
India and Burmah	31,000	30,000	—
German Colonies, New Guinea, Samoa, West Coast Africa, &c.	38,000	—	—

The world's supply of about 69,000 tons has been mostly consumed. In 1908 we had 65,000 tons; in 1907, 69,000 tons; and in 1906, 65,000 tons. "Slab" rubber was scarce and sold well, "ball" plentiful (and of good quality) and met a very ready sale. "Tails" improved and sold better.

The year opened with fine hard firmer and more active, at 7s. 7½d. for spot, February to March, 7s. 6½d. Castilloa 4s. 3d. to 4s. 3½d. By the 14th the market had gone back a little, mainly owing to the larger receipts in Brazil, but again hardened at the sales on the 18th.

Sales included: Hard fine, January, 7s. 7d. to 7s. 7½d., January to February, 7s. 7¼d. to 7s. 5d., February to March, 7s. 6¾d. Castilloa ball firmer at 4s. 4d.

Rubber Shares.

During the week ending 13th January business in rubber shares continued very active, and a considerable improvement has taken place in quotations since the 6th. But the market went extremely wild at times, and it was not always easy to deal even at nominal prices.

Comparative prices with last month rule as follow:—

	December 17th.	January 6th.
Bukit Rajah	8	9 to 9¼
Cicely Estates Co. (Ord.) ...	25/- to 26/-	29/- to 30/-
Highlands and Lowlands	$3\frac{1}{16}$ to $3\frac{1}{8}$	$3\frac{13}{16}$ to $3\frac{15}{16}$
Klanang Produce Co.	5¾ to 6	6½ to 6¾
Lanadron Estates	2⅛ to 2⅜	3¼ to 3½ p.
Linggi Plantations (2/- paid) ...	23/6 to 24/-	26/6 to 27/-
Perak Rubber Co.	3 to 3⅛	3⅜ to 3½
Selangor Rubber Co. (2/- paid) ...	35/- to 36/-	37/6 to 38/6
Shelford Rubber Co.	1⅜ to 1½	$1\frac{11}{16}$ to $1\frac{13}{16}$
United Serdang Rubber Co. ...	2⅝ to 2⅞	$3\frac{15}{16}$ to $4\frac{1}{16}$
Vallambrosa Rubber Co.	22/3 to 23/9	26/6 to 27/-

p = premium.

VANILLA CULTURE FOR TROPICAL QUEENSLAND.

By HOWARD NEWPORT, F.R.H.S., Instructor in Tropical Agriculture.

The culture of Vanilla offers facilities to the settler in the northern parts of the Agricultural belt of Queensland that hitherto have been but little availed of. Some twelve or fifteen years ago Vanilla commanded a price so high (25s. to 30s. per lb.) that considerable areas were planted up in various parts of the world, and big money if not actual fortunes were made. The result that history has shown to be inevitable under such circumstances followed—chemists turned their attention to the production by synthesis of an article so much in demand, and by close planting and overbearing, diseased conditions were induced in the plantations. On the evolution of a synthetic product more or less similar or at least usable as a substitute and cheaper, coupled possibly with the dying out of hundreds of thousands of vines—notably in the Seychelles—the price dropped to 3s. to 5s. per lb., and the industry as a whole suffered a considerable set back.

The history of tropical—as well as other—agricultural products of this nature—of a group that may perhaps be called auxiliary rather than primary—also shows us, however, that these things work in cycles, and that Nature generally comes out ahead in the end. It is, then, for the tropical agriculturist to follow the trend of demand and supply of products such as the one under discussion, and be prepared to take advantage of the fact of an increased demand in the near future.

While the production of a more or less satisfactory substitute, being synthetically supplied, may prevent a rise in price to the level previously attained, it would seem that a reaction is taking place, and the demand for the natural Vanilla beans or pods is increasing and the price slowly, very slowly, but surely, on the upward grade, good qualities fetching 16s. to 17s. 6d., and the poorer qualities down to 8s.

Some of the special advantages in Vanilla culture for tropical Australia lie in the fact of its requiring very little clearing of the land. Scrub land *with the trees standing—i.e.*, fairly heavily shaded clearings—are essential.

In this part of Queensland the felling of the heavy scrub often costs 30s. to 40s. per acre, and anything up to another £10 may be expended in clearing it for planting; this is at once eliminated, and the lightest of brushing at a cost of a few shillings per acre substituted for it. The work is light and easy, no digging or ploughing being involved, and can be done by women and children. Vanilla is, in fact, the least troublesome in its culture of almost any agricultural staple.

The returns per acre are high and often very large, and the product is of high value per bulk and not readily perishable, and, therefore, lends itself to cultivation in places that are as yet the more difficult of access and the transport from which of the more bulky staples is a matter of some moment. No diseases are known to exist on Vanilla here, and the climate, soil, and rainfalls are particularly in its favour.

When Vanilla was first introduced into Queensland it is difficult to say. Mr. L. A. Bernays mentions two varieties having been already introduced into Queensland in his "Cultural Industries," dated 1883, but Baron F. von Mueller omits any reference to the plant in his "Select Extra-tropical Plants," dated 1888, which would seem extraordinary.

The Vanilla of commerce is the dried and prepared pods of several species of climbing orchids. The name "Vanilla" is said to be the diminutive of the Spanish "vaina," a pod. Vanilla is a native of Central and South America, and is cultivated in Mexico, Brazil, Honduras, Guadelope, Reunion, Mauritius, The Seychelles, Java, Tahiti, the S.S. Islands, in Polynesia, &c.

There are eight or more known varieties that produce marketable pods, of which five are found in Mexico. The three best known varieties are *V.*

Plate XI.

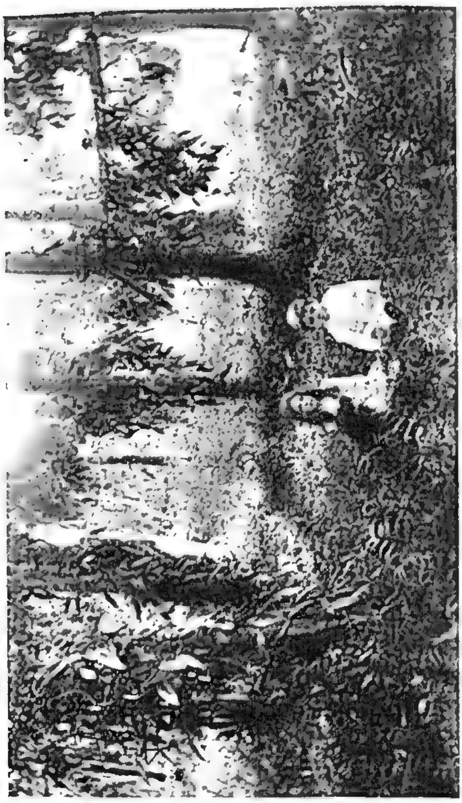


Fig. 1.—Showing Density of Shade.

Fig. 2.—Showing Trees Left Standing when Clearing.

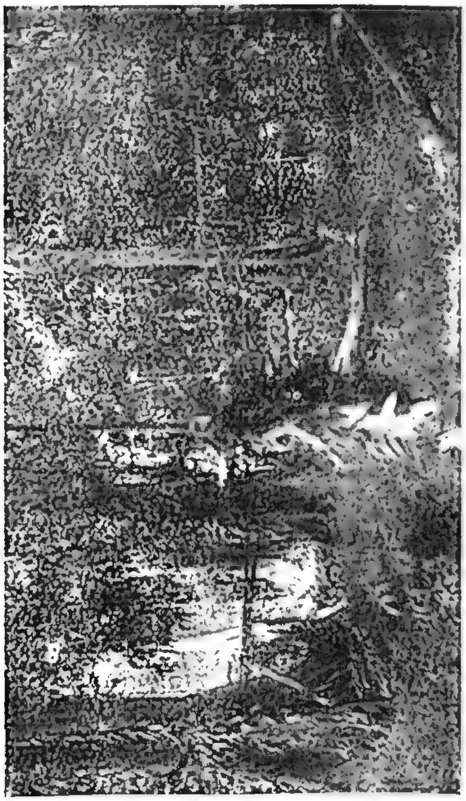


Fig. 3.—Showing Vanilla on Post and Trees.

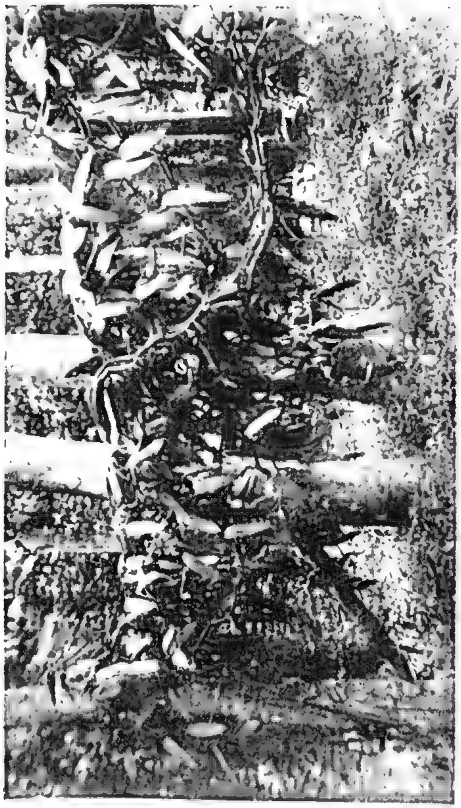


Fig. 4.—Showing Method of Draping Vanilla Vines on Bars between Trees.

planifolia, *V. sylvatica*, and *V. pompona*. *V. planifolia* produces long, thin pods of great aroma, which, however, require treatment; the pods of *V. sylvatica* are found to split to an undue extent, which reduces the value of the product, and *V. pompona* pods are small and short, another disadvantage in marketing, though these pods may be left on the vine to brown.

V. planifolia is the best variety for cultivation, and as it is of this variety only that plants, or rather cuttings, can be obtained in this country, the following cultural notes, unless otherwise specified, may be taken as alluding to this species only.

The Vanilla vine is of exceedingly handsome habit of growth, and, like most orchids, is a true epiphyte, so that while requiring a support—a living tree by preference—to grow on, it obtains none of its nutriment from that tree. As a plant it is curious in that neither the flowers, leaves, or pods in the green state have any scent, and give no idea, therefore, of the fine aroma and flavour that are developed on the pods being cured; in that its flowers are very rarely fertilised by natural means; and also in that, though an orchid, to thrive it must have connection with the ground. At first the cuttings must be planted in the ground, but as it ascends its support it is not unusual for the original stem to shrink and die away at the ground end. This in no way adversely affects the plant, however, as it has meanwhile sent down aerial rootlets which on reaching the ground become independent subterranean sources of supply of plant food; nevertheless, the greater part of its nutriment is obtained from the atmosphere by means of its thick fleshy leaves and tendrils or aerial roots. Like all orchids heat, moisture, and shade are essential to its successful culture.

SOIL, CLIMATE, AND RAINFALL.

Vanilla requires a rich vegetable soil and a well-drained situation. Sandy soils are too light, do not hold enough moisture, even though shaded, and require manuring; while clay soils hold too much water and are too heavy.

Any of the ordinary scrub soils of Northern Queensland having a foot or more of rich leaf mould are just what the Vanilla vine likes best. In climate Vanilla seeks hot, moist conditions, with a temperature between 70 degrees and 90 degrees Fahr., which is again what is generally to be found in North Queensland scrubs. In the matter of rainfall from 50 to 60 up to 200 or more inches per annum is required, the nearer the average is to the 100 the better, and, if possible, a locality having a well-distributed rainfall for nine or ten months in the year, and two fairly dry months—viz., August to October—is a material advantage.

LAY, ASPECT, AND SITUATION.

In selecting a site for a plantation in this country fairly level land may be chosen. A gentle slope is an advantage in preventing the lodging of storm water and insuring surface, and probably also subsoil, drainage. Gently undulating country will do, but the steeper slopes as well as the low-lying hollows should be avoided. Vanilla is a very soft-bodied plant, and, though it wants moisture, it abhors stagnation—so much is this to be avoided that, in some countries, beds 6 in. to 1 ft. high, and in a circle 4 ft. or so in diameter round the supporting tree, are often made by a ring of stones filled in with leaf mould to make sure that water cannot accumulate and stand round the roots—the stones are said to afford the roots protection and keep them cool too. This, however, will not generally be necessary in Queensland. Wind is another enemy of Vanilla, especially where the thick vines are draped in curtains over the supports and can swing and break. A westerly aspect may be chosen on this account, though this point is governed by the amount of natural protection to be found on the weather side of the clearing or plantation. Almost any situation may be chosen with the one exception of too great proximity to the sea; salt air is harmful, keeping the vines poor and stunted.

CLEARING, SHADE, AND SUPPORTS.

Having selected the site, the next matter to bear in mind is that Vanilla wants shade, supports, and humus. Under certain conditions Vanilla is planted in the open, and special shade trees grown at stated intervals for its accommodation; this, however, is risky, more costly, involves delay, and is unnecessary here.

The standing scrub supplies all the essentials, and, as before stated, requires but a brushing. The shade necessary is not dense, but chequered. With too much shade in this country it has been found that the vine grows luxuriantly, but will not bear, and with too little the reverse happens. Where very dense only the big trees may, therefore, be left, and in lighter scrub saplings of even 4 in. to 6 in. diameter are retained. When cleared 250 to 300 trees left standing to the acre, which afford both shade and support, would be about right.

Humus being an essential, it is highly inadvisable to burn off any brush; if possible, it is better to pull it into heaps and let it rot.

As the vines grow they must be kept within reach. They grow quickly, and the natural tendency is to run up the trees to great heights. When this happens the vines are pulled down and draped over supports fastened between the trees, 4 ft. to 6 ft. above the ground. These supports should be hardwood, round by preference, and of 3 in. to 4 in. diameter, and may be spiked to the trees. If the trees are fairly hard wood, tough wooden spikes 12 in to 18 in. long, and about 1 in. diameter, may be driven into auger holes in the trunks at about the same height, and the vines draped on these. In soft woods like candle-nut these soon perish, however, and let the vine fall, or possibly even kill the tree. Wire is cheap, easily erected, and fairly lasting, but forms too sharp a bend for the fleshy vines, which are apt to break or be frayed in two if swinging in the wind.

Two No. 8 wires 4 in to 6 in. apart strung from tree to tree may be the best alternative if wooden bars are not available, or the trees are too uniformly soft to carry spikes, but even then pieces of bark or old sacking should be put between the vine and the wire, as the acid in the sap in time causes even galvanised wire to rust, damaging the plant, and ultimately causing the wire to break.

The clearing is now ready for planting, and, if well brushed, should only require going over with a brush knife once a year or so. Chipping or weeding is unnecessary if properly shaded, and is detrimental as tending to disturb and damage the delicate roots which are so near the surface as to be barely in the ground at all. A carpet of dead leaves is what is wanted.

PLANTS AND PLANTING.

Vanilla is usually and is best propagated by cuttings. Plants can be raised by seed, but the process is troublesome, rather intricate, and takes about a year longer. The seed is very minute, and if seedlings are required the seed should be washed in soap-suds, mixed with fine sand, dried, and carefully sown in prepared soil in a specially protected situation—a bush-house or glass germinating house by preference. Cuttings, however, are generally obtainable. In such places as the Seychelles, where plenty are available, these cost from 4s. to 6s. 8d. per 100, but here may cost anything up to 6d. each. Cuttings of 6 ft. in length are best, but if plants are urgently needed may be sub-divided into lengths of not less than three eyes.

The best time to plant is at the beginning of the wet season, about Christmas time, or soon after, when full advantage of the rain can be taken. September plantings—if planting weather obtains—save a lot of time, but with so soft and fleshy a plant as Vanilla, watering must generally be resorted to in October and November, or many will be lost. With fortunate weather a

Plate XII.

FIG. 5.—CLUSTER OF BLOSSOMS ON VANILLA VINE.
Showing 5 set, 1 just pollinated and as yet uncertain, 1 just open (above), a number of unopened buds.

Plate XIII.

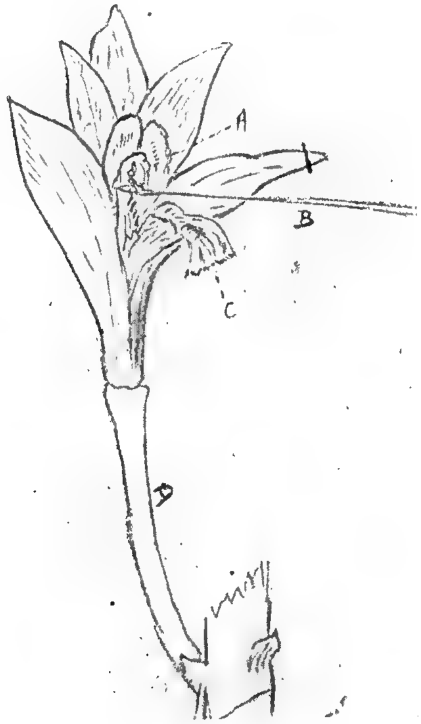


Fig. 6

Whole Flower, about ¾ Life Size, showing Positions of Pollinating Tool in Operation.

A. Column with male and female organs.
B. Pollinating tool.
C. Petal torn down to disclose organs.
D. Embryo pod.

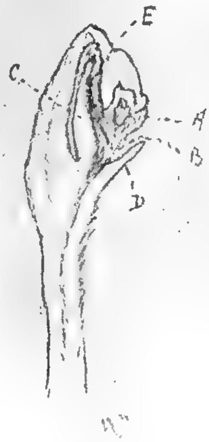


Fig. 7. Fig. 8.

Longitudinal Section through Male and Female Organs.

A. Anther or male organ with pollen
B. Stigma or female organ.
C. Upper lip or lid.
D. Lower lip or lid.
E. Sectional view of pollinating tool.

Fig. 7.—Commencement of pollinating operation.
Fig. 8.—Completion of pollinating operation.

September planting may save a year in bringing a field into bearing, but is risky.

The planting is done by digging a shallow trench some 2 in. deep and wide in the soil at the base of the tree trunks, laying therein a portion of the vine from which the leaves have been carefully cut off, pressing leaf mould on top and covering or mulching it with dead and rotting leaves and vegetable matter. This accomplished, the rest of the vine is laid vertically against the tree and tied there by some soft material sufficiently broad not to cut the soft Vanilla. Two plants should be planted against each tree, or if large, with no other trees near it, three. The length of the trench depends on the length of cutting—for 6-ft. lengths three to four nodes or eyes, and for three-knot lengths one eye, may be put into the ground.

The vines grow quickly, and if good seasons are experienced some crop will be obtained in the second year after planting. Usually it takes three years, however, and the plantation gradually increases in productivity as the vines increase in length, and are draped round the trees on the pegs or between them on the rails set for them in thick and somewhat untidy-looking festoons. A plantation will last thirty or forty years, possibly more, and is not considered in full bearing till six or seven years old.

If 250 tree trunks are left standing and two cuttings are set to each, 500 plants will be absorbed in the acre—more or less may be planted—there is no hard-and-fast rule for this method of planting in virgin scrub land, but more implies rather dense shade, so less would be the more advisable.

Manuring and Pruning.

The Vanilla crop is said to be to some extent an exhausting one, though this is usually only noticeable in plantations where the shade trees are especially grown, the soil is deficient in humus to start with, and the moist and humid conditions so much liked by Vanilla do not exist, and it has to rely for nutriment mostly in the soil.

Usually the radius within which the roots of any one vine extend is quite small—3 ft. or 4 ft. at most—so that in virgin scrub land, with a good surface of leaf mould, manuring should not be required for many years, if at all. For sick vines in exposed situations or overbearing plants the only manure required is *humus*, which is best supplied by an armful of leaf mould and dead leaves. Artificial manures should be avoided, and especially animal matter of any kind.

No pruning is necessary either, under normal conditions. Under conditions of too heavy shade or too heavy wet and cloudy weather just before blossoming time—about September—sometimes the nipping off of the growing tips will induce the production of flower spikes. Otherwise the only operation of this nature is the careful pulling down of vines that have run up a tree trunk and draping it within reach—also done about September—*i.e.*, before the blossoming. This operation has to be somewhat carefully done, as the vines break easily, and is best accomplished by two persons with long, thin forked sticks like clothes props, one working the fork up between the vine and the tree, carefully disengaging the tendrils, and the other catching the loose vine in the fork of his stick and lowering it gently down.

Flowering.

In the second year a few flowers may be seen, enough to study and practise on, but not enough to count on as a crop. By the third year, however, commencing here early in October, and lasting till the end of November or later, a large proportion of the vines should produce flowers, which they will do by sending out fat, bright green buds in the axils of the leaves here and there, seldom in two consecutive eyes, which will grow only an inch or two in

length before bursting into clusters of buds. One cluster to a yard or so of vine is a good flowering. In a few days the first flowers of the cluster will open, and it will continue slowly developing and opening blossoms for sometimes two months or more. This flowering is the most interesting if not the most anxious time for the grower.

FERTILISING OR POLLINATING.

The Vanilla blossom while having the male and female organ in the same flower is of such construction that it cannot fertilise itself. The insects that fertilise Vanilla do not exist here or, indeed, in most countries where Vanilla is produced commercially. Even where they do exist—the wild forests of Mexico—the proportion of flowers so fertilised is very small. Each blossom has, therefore, to be artificially fructified or fertilised. Considering that each vine may produce hundreds and a plantation thousands of flowers, and it takes roughly—allowing for failures—some 150 or 200 such fertilisations to give 1 lb. of Vanilla beans, the work might appear appallingly great. As a matter of fact, it is very simple and quickly done. So simple is it that children can do it easily and so rapidly that hundreds (experiment at Kamerunga has shown about 1,000) can be fertilised in a forenoon.

While the process is simple, it must be thoroughly understood to be carried out successfully. The best way is to get a flower and pull it to pieces with this description and the illustrations in front of you.

The tool necessary is a little piece of stick—bamboo splinter or toothpick—some 3 in. long and $\frac{1}{8}$ in. wide, and quite thin and flat. A pin hammered out flat at the point and the head cut off stuck into a piece of pencil for a handle makes an excellent fertilising tool.

A glance at the illustration will give more idea of the flower than any technical botanical description. When examined this flower will be found to have only one thin petal which has any colour on it (and not much of that); when this is gently torn away it is found to be growing from the sides of and protecting a white or pale-green rigid little column with a knobbed top. This carries the male and female organs, and any damage to it must be carefully avoided. The tube to the stigma or ovary has two lips at the top end, the upper one longer than the lower one forming a flap or lid; above this is the male or pollen-bearing part hanging over as though on a hinge at the top of the column. The process of fertilisation or pollination as it is generally called consists of taking the flower between the thumb and second finger of the left hand with the forefinger at the back of the top of the little column, placing the fertilising tool sideways flat against the front of the column and gently lifting it.

The illustration, which is a section, shows what takes place. First, the lower lip is lifted, or rather both are lifted together; then the lower one, being shorter, slips from under the tool, leaving the aperture open. The pollen glands are then lifted, and the upper lip, which prevents the pollen falling in naturally, is forced behind them, and the pollen glands fall forward again. Now, care must be taken not to raise the tool any further, or the part containing the pollen is cut off. At this juncture the flower is held between the fertilising tool and the first finger of the left hand, the left thumb is then gently pressed on top of the pollen masses, pressing them on to the stigma, where they stick, while the tool is withdrawn sideways, and the pollination is complete.

The vine blossoms in Queensland between September and November. Each cluster, as will be seen from the illustration, consists of some fifteen to twenty flowers, which open successively at the rate of not more than three, and generally only one, a day. These flowers remain open only the one day, and pollination is difficult as well as most uncertain once the flower

has begun to wither. It is necessary, therefore, to go round the plantation every day in the flowering season, round every vine, and to each cluster, once it has begun to open its blossoms. The pollinating is best done in the forenoon, from sunrise to noon, or not later than about 2 p.m.

In this time a good worker may pollinate 1,000 flowers; it would be a fairly large plantation to average 1,000 blossoms a day, and in a plantation such as might with success be opened in Queensland the pollinating could be finished in an hour or two each morning.

The success or otherwise of the fertilising operation can be seen by the second or at latest third day. When the blossom opens the stalk of the flower, which is really the embryo pod, is seen to be a bright green colour. If the pollination has been successful this retains its colour, begins to swell perceptibly by the second day, while the blossom itself fades as quickly, but does not fall off, sometimes adhering to the quickly growing pod for a month or more. If the operation on the other hand has not been successful, the embryo bean turns a yellow colour, does not swell, and the blossom usually falls off within three days, sometimes at once. The pollinating is frequently left entirely to women and girls in other countries, and is light and easy enough work for them in this country.

ORANGE WINE.

In a tub or vat of 15 or 20 gallons capacity, carefully cleaned, put 40 lb. of peeled oranges, rejecting any unsound ones. Then bruise the fruit and pour 4 gallons of water over it. Stir the whole carefully, and work well with the hands until the juice and pulp are separated from the solid matter. Then let the whole rest for ten to twenty-four hours, and strain through a coarse bag, with gentle pressure. A gallon of fresh water is to be added to the mash, to remove any soluble matter remaining, and is strained into the other liquor. From 25 lb. to 30 lb. of white sugar are next dissolved in the must or juice thus obtained, and the measure of fluid increased by more water to 10½ gallons. The must is next put in a tub or vat, over which a blanket is thrown, and a board over that; and the whole kept at a temperature between 55 deg. and 60 deg. Here it must remain for twelve to twenty-four hours, according to the state of the fermentative process. It is then to be drawn off into a cask, until the fluid reaches the bung-hole, so that the scum may overflow and be thrown out. As fermentation goes on, and the bulk of the liquid diminishes in the cask, the superfluous must made for that purpose should be poured in, so as to keep the liquid near the bung-hole. When the fermentation diminishes still more, which may be known by the cessation of the hissing sound, the bung is driven in and a gimlet hole bored on one side. Put a wooden peg in this hole, and remove it from time to time to let the gas escape; when the escape of gas is too feeble to extinguish a lighted match, knock the peg in for good. Then fine the wine with a tablespoon of isinglass, and in a few weeks it will be fit for bottling.

Times of Sunrise and Sunset at Brisbane, 1910.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·56	6·46	5·21	6·42	5·41	6·20	5·57	5·47
2	4·57	6·46	5·21	6·42	5·41	6·19	5·58	5·46
3	4·58	6·46	5·22	6·41	5·42	6·18	5·58	5·45
4	4·59	6·46	5·23	6·41	5·42	6·17	5·59	5·43
5	4·59	6·46	5·24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·24	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·39	5·44	6·14	6·0	5·40
8	5·1	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5·3	6·47	5·28	6·37	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·36
12	5·4	6·47	5·29	6·35	5·47	6·9	6·3	5·35
13	5·5	6·47	5·30	6·35	5·47	6·8	6·4	5·34
14	5·6	6·47	5·31	6·34	5·48	6·7	6·4	5·33
15	5·7	6·47	5·31	6·33	5·49	6·6	6·5	5·31
16	5·8	6·47	5·32	6·32	5·49	6·4	6·5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5·29
18	5·9	6·47	5·33	6·30	5·50	6·2	6·6	5·29
19	5·10	6·47	5·34	6·30	5·51	6·1	6·7	5·28
20	5·11	6·47	5·35	6·29	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·13	6·46	5·36	6·27	5·52	5·58	6·8	5·25
23	5·13	6·46	5·37	6·26	5·53	5·57	6·9	5·24
24	5·14	6·45	5·37	6·25	5·53	5·56	6·9	5·23
25	5·15	6·45	5·38	6·24	5·54	5·54	6·10	5·22
26	5·16	6·45	5·39	6·23	5·54	5·53	6·10	5·21
27	5·16	6·44	5·39	6·22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6·21	5·55	5·51	6·11	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6·43	...	..	5·56	5·49	6·12	5·18
31	5·20	6·43	...	...	5·57	5·48	...	...

PHASES OF THE MOON.

			H. M.
3 Jan.	☽	Last Quarter	11 27 p.m.
11 „	●	New Moon	9 51 „
18 „	☾	First Quarter	8 21 „
25 „	○	Full Moon	9 51 „
2 Feb.	☽	Last Quarter	9 27 p.m.
10 „	●	New Moon	11 13 a.m.
17 „	☾	First Quarter	4 33 „
24 „	○	Full Moon	1 36 p.m.
4 Mar.	☽	Last Quarter	5 52 p.m.
11 „	●	New Moon	10 12 „
18 „	☾	First Quarter	1 37 „
26 „	○	Full Moon	6 21 a.m.
3 April	☽	Last Quarter	10 48 a.m.
10 „	●	New Moon	7 25 „
17 „	☾	First Quarter	0 4 „
24 „	○	Full Moon	11 23 p.m.

Chemistry.

ANALYSES OF FERTILISERS.

BY J. C. BRÜNNICH, Chemist to the Department of Agriculture and Stock.

Since the introduction of the "*Fertilisers Act of* 1905" it has been customary to check the composition of all our commercial fertilisers by getting our inspectors to collect once or twice a year samples from all the dealers, and to have these samples analysed at our Agricultural Laboratory.

A complete list of these analyses carried out recently is herewith published for the information of our farmers.

In accordance with the Act, every dealer, manufacturer, importer, or agent who deals in fertilisers for the purposes of trade is required to register every year, giving the names or brands of fertilisers dealt in by him. We have now thirty-six registered dealers in our State. Upon the sale of any fertiliser the seller must supply to the buyer an **invoice certificate**, signed by the seller or his agent, stating full name and place of business of the seller, trade mark, brand, or other sign used to identify such fertiliser; quantity of the fertiliser or net weight in lb.; and the composition of the fertiliser, giving the respective amounts of nitrogen, phosphoric acid, and potash contained therein. Such a certificate can be attached in form of a label to each bag or package, or it may be supplied separately in form of printed slips, but the **bag must be distinctly branded** with the number of net pounds of fertiliser in the bag or package, and the figure, trade mark, or sign under which the fertiliser is sold.

With regard to the carrying out of this regulation some of our inspectors report a neglect on part of the dealers, and, therefore, the *attention of all vendors* is directed to Clauses 6 and 7 of the Act, and particularly subclause 5 of Clause 7, *which in future will be strictly enforced.*

The latitude allowed under the Act, in any **deficiency** in the composition, is a fairly liberal one, amounting to 5 per cent. of the total nitrogen or of potash certified to be present, if the fertiliser contains not less than 10 per cent. of nitrogen or potash, and 7 per centum of the total phosphoric acid certified to be present, if the contents of phosphoric acid are not under 15 per cent. In the case of fertilisers containing smaller amounts of fertilising ingredients, less than 10 per cent. of nitrogen or potash, and less than 15 per cent. of phosphoric acid, the amounts of deficiency allowed are—nitrogen and potash ½ per cent., and phosphoric acid 1 per cent.

On the whole, it may be stated that the composition of the fertilisers agrees fairly well with the guaranteed amounts, which, for this reason, are not given on the table. A few of the exceptions are herewith quoted.

A sample of sulphate of potash, analysis No. 1145, which in accordance with our analysis contained 50·52 per cent. of potash, was guaranteed to contain 96 per cent. of pure potassium sulphate, equivalent to 51·9 per cent. of potash. The limit of deficiency is 5 per cent. of 51·9 or 2·6 per cent., so that the sample being only 1·4 per cent. under guarantee fell well within the legal limit.

In the fertilisers Nos. 924 and 946—Shirley's No. 5 manure, which is supposed to contain 7 per cent. of potash, the legal deficiency would be ·5 per cent., as the manure contains less than 10 per cent. of potash, and the sale of any of this fertiliser containing less than 6·5 per cent. of potash, would be an offence under the Act. We find that sample 924 is up to standard, but sample 946 falls below the legal standard. Again, sample 927, Shirley's

No. 19, is supposed to contain 4·1 per cent. of nitrogen, but we found only 3·26 per cent., which is again under the deficiency legally permissible, amounting to 3·6 per cent.

Hitherto great confusion has existed through stating the composition of fertilisers in various ways, giving, for instance, phosphoric acid as bone phosphate, tricallic phosphate; nitrogen as ammonia and ammonium sulphate; potash as potassium sulphate and potassium chloride, &c. All such statements only mislead the farmer, and to avoid this, the Act provides for the statement of the valuable fertilising ingredients in percentage amounts of **nitrogen** (N), **potash** (K_2O), and **phosphoric acid** (P_2O_5).

The conversion of the amount of one compound into another is very simple, and as many manuring formulæ contain the old denominations, I will repeat here a table for such conversion which appeared in my 18th Lesson on the Chemistry of the Farm, Dairy and Farm:—

Amount of—	Multiplied by—	Gives the Corresponding Amount of—	
Ammonia, NH_3	0·824	Nitrogen, N	
Ammonium sulphate $(NH_4)_2SO_4$ ...	0·212	Nitrogen, N	
Sodium nitrate (Chili saltpetre), $NaNO_3$	0·165	Nitrogen, N	
Potassium nitrate (saltpetre), KNO_3 ...	0·1835	Nitrogen, N	
Nitrogen, N	1·214	Ammonia, NH_3	
Potassium sulphate, K_2SO_4	0·541	Potash, K_2O	
Potassium chloride, KCl	0·631	Potash, K_2O	
Potassium nitrate, KNO_3	0·466	Potash, K_2O	
Potash, K_2O	1·850	Potassium sulphate	
Tricalcic phosphate, bone phosphate, $Ca_3P_2O_8$	0·158	Citrate insoluble ...	Phosphoric acid, P_2O_5
Monocalcic phosphate, $CaH_4P_2O_8$ ...	0·607	Water soluble ...	Phosphoric acid, P_2O_5
Tetracalcic phosphate, $Ca_4P_2O_9$ ...	0·391	Citrate soluble ...	Phosphoric acid, P_2O_5
Limestone, marble, $CaCO_3$	0·560	Lime, CaO	
Gypsum, $CaSO_4$	0·411	Lime, CaO	

It will be noticed in this table, and also in the table of analyses, that **phosphoric acid** appears under three different headings—**water soluble, citrate soluble,** and **citrate insoluble phosphoric acid.** A short explanation of these terms will not be out of place.

In bones, and in most of the mineral phosphates, phosphoric acid exists in combination with lime, in the form of a calcium phosphate: **Tricalcic phosphate,** which is insoluble in water and in citrus acid solutions, but soluble in mineral acids. On account of this insolubility the action of bone manure and mineral phosphates is exceedingly slow, and may extend over many years. The finer the bones or the phosphates are crushed or powdered the quicker will be the action, and for this reason the fineness of the bone meal is of importance, and should be stated.

When strong sulphuric acid is allowed to act on this insoluble tricallic phosphate, part of the lime combined with the phosphoric acid is withdrawn, lime sulphate or gypsum being formed and the phosphoric acid is left in the form of **monocalcium phosphate.**

$$\underset{\text{Bone phosphate or tricalcic phosphate.}}{Ca_3P_2O_8} + \underset{\text{Sulphuric acid.}}{2H_2SO_4} = \underset{\text{Gypsum.}}{2CaSO_4} + \underset{\text{Monocalcium phosphate or superphosphate.}}{CaH_4P_2O_8}$$

This new compound is soluble in water, and therefore readily available to the plants, but on account of the special process of manufacture it is the most expensive form of phosphoric acid in our fertilisers. The superphosphate is generally manufactured from steamed bones, bone ash, and mineral phosphates. Mineral phosphates containing a high amount of iron or alumina are not suitable for the manufacture of superphosphates, because these bases readily recombine with this acid phosphate, to form again insoluble phosphates, called reduced or reverted phosphates. A similar change would take

place if lime were added to superphosphate, and also in soils containing a large amount of lime, a **dicalcium phosphate,** $Ca_2H_2P_2O_8$, may be formed, which is insoluble in water, but soluble in citric acid solutions. Another form of a lime phosphate is found in basic slag or Thomas phosphate—namely, **tetracalcium phosphate,** $Ca_4P_2O_9$, which also is insoluble in water, but soluble in saline solutions, particularly such which contains salts of citric acid. These last two compounds are, therefore, classed as citrate soluble phosphoric acid, which is fairly readily absorbed by the plant roots, and, therefore, comes close in its value to the water-soluble phosphoric acid. Basic slag is an artificial product, and should be ground as fine as possible, and a good sample of this fertiliser should nearly all pass through a sieve having 100 meshes to the linear inch. Thomas phosphate is one of the cheapest and best sources to supply phosphoric acid; it is of particular value to sour lands, deficient in lime but rich in humus.

Nitrogen is the most expensive of all the fertilising ingredients of a manure, and is chiefly supplied in form of **nitrate nitrogen,** as in Chili saltpetre, or in form of **ammonia salts,** as in ammonium sulphate, or in form of organic nitrogen, as in blood, meatworks manure, &c. Nitrate of soda is a very quick-acting manure, as nitrogen in the form of nitrate is in the most available form, but nitrates are not readily retained or absorbed by the soil, and therefore liable to be washed away by heavy rains. Nitrogen in ammonium sulphate is not in such an available form, as it has to be changed into nitrates by the process of nitrification.

Favourable conditions and lime salts are necessary for this process, and in soils very deficient in lime this manure, therefore, may give poor or no results. Ammonium salts are retained and absorbed by the soil, and losses in the drainage water are not to be feared.

Of particular interest are the samples of **nitrate of lime,** and **nitrolim or calcium cyanamide,** of which large quantities are being imported.

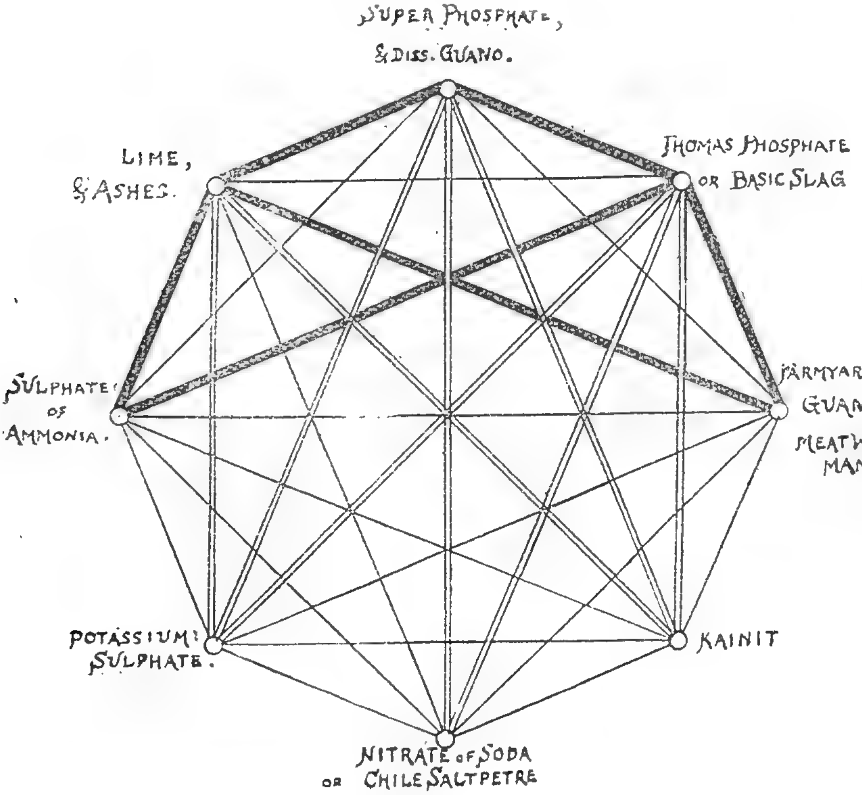
These artificial fertilisers, which are really produced from nitrogen in the air, have given excellent results in a very large number of manuring trials, conducted the last three or four years, all over the world. I believe that our soils, of which a great number are rather deficient in lime, will derive particular benefit from these nitrogenous manures. The form of nitrogen in nitrolim is apparently nearly as available as the nitrogen of nitrates, much quicker in action than ammonia nitrogen, and not depending on the presence of lime in the soil. Nitrate of lime has the great advantage over nitrate of soda of not draining so easily through the soil. Nitrate of soda rather tends to exhaust soils, and spoils their physical conditions by depriving them of the lime, which faults are prevented by using nitrate of lime. Nitrolim is a very fine slate black powder, shipped in barrels, and is not liable to cake and may be mixed with almost any artificial manure. As already stated, the action of this manure is only slighly slower than that of nitrates, and the large amount of lime (up to 50 per cent.) which it contains is in itself a great advantage. I believe that this new manure will prove of great value to our pineapple farmers and cane-growers.

Potash is generally used in form of the potassium sulphate. The chloride and kainite are as a rule not so suitable to our soils.

When studying the composition of the mixed fertilisers on the table of analyses, it will be noticed that in most of them the amounts of phosphoric acid are rather high as compared with the amounts of nitrogen and potash. For this reason I generally recommend farmers to make their own mixtures from the pure concentrated manures, according to the requirements of their soil and crops.

When **mixing fertilisers** together, such mixtures must be avoided which would lead to decomposition, which, for instance, would take place if ammonium sulphate was mixed with lime or with Thomas phosphates, superphosphate with lime; or which may cause caking, like mixing kainite with

Thomas phosphate. A very simple guide for the mixing of manures is given in the accompanying diagram, devised by Dr. Geekens, which I slightly modified, however, to apply to our local conditions.



It is a matter of extreme difficulty to fix the **monetary value** of a **manure**, as so many factors influence the value. Cost of manufacture and mixing, bagging, rebagging, labelling, loss during storages, deterioration and decomposition on keeping, carriage, and freight, &c., have to be taken into consideration. Again, in many cases the value derived from the chemical composition does not represent the actual value of the fertiliser, which again depends upon many causes, local conditions and requirements.

Some method of comparison is absolutely necessary, and for this purpose it is customary to use **unit values**, which are the cost price of 1 per cent. per ton of the various fertilising constituents, or actually the cash value of 22·4 lb. of each ingredient. For instance, in a sulphate of ammonia costing £15 per ton, containing 20·68 per cent. of nitrogen, the unit value of nitrogen would be $\frac{15 \times 20}{20 \cdot 68} = 14 \cdot 5s. = 14/6.$

The following **unit values** were approximately fixed for the calculation of **the manurial value per ton in Brisbane**:—

		s.	d.
Nitrogen ...	as nitrate	16	0
	in ammonium salts	14	6
	in blood, fine bone, &c.	14	6
Potash ...	as sulphate	5	6
	as chloride	5	0
Phosphoric acid	water soluble	5	3
	citrate soluble	4	0
	Insoluble as in fine bones	3	0

As an example, we will calculate the value of the mixed fertiliser No. 923, Shirley's No. 3 manure, which is supposed to contain 13 per cent. water soluble phosphoric acid, 3·3 per cent. nitrogen, and 2 per cent. potash. From the analysis we find that it contains 13·3 per cent. water soluble phosphoric acid, ·87 per cent. insoluble phosphoric acid, 1·87 per cent. potash, and 3·36 per cent. nitrogen, and the value per ton is, therefore, as follows:—

N	3·36	×	14s. 6d.	=	48·72s.
K_2O	1·87	×	5s. 6d.	=	10·29s.
Water sol. P_2O_5	13·3	×	5s. 3d.	=	69·83s.
Insol. P_2O_5	·87	×	3s. 0d.	=	2·61s.
					131·45s. = £6 11s. 5½d.

The advertised market value of this manure is £6 15s. per ton in Sydney, and £8 in Brisbane, which latter is rather high.

On the whole, it may be stated that these comparative manurial values fairly well represent the market value, if the manures are purchased on a fairly large scale. It is, of course, quite impossible to get manures in small lots of 1 or 2 cwt. at this price, particularly such manures as superphosphate and nitrate of soda, which require frequent rebagging.

The farmers have the means in their own hands to attain cheap and reliable fertilisers—they simply have to co-operate and order large quantities, a few months ahead, and in this case the fertilisers will be obtained just as cheaply here in Brisbane as in Sydney or Melbourne.

Of course, for our Western and Northern farmers the freight on manure will considerably raise the cost, but even in these cases considerable saving will be effected on ordering large quantities, and all the manure vendors will make special quotations for such orders.

ANALYSES OF FERTILISERS.

TAKEN AND ANALYSED UNDER "*THE FERTILISERS ACT OF* 1905."

Number of Analysis.	Fertiliser.	Where Obtained.	Moisture.	Phosphoric Acid P_2O_5. Water Soluble.	Citrate Soluble.	Total.	Potash, K_2O.	Nitrogen, N.	Mechanical Condition. Coarse.	Middling.	Fine.	Comparative Manurial Value per Ton. £ s. d.	Remarks.
	Simple Fertilisers: Potash Manures.												
933	Muriate of potash	Webster and Co., Brisbane ...	·33	...	...	...	58·70	...	...	...	...	14 14 0	Equivalent to 93·12 per cent. KCl
935	Sulphate of potash	ditto ditto ...	·43	...	...	...	53·50	...	...	...	...	14 14 0	Equivalent to 98·10 per cent. K_2SO_4
147	Ditto	ditto ditto ...	·32	...	...	...	48·86	...	...	...	...	13 9 0	Equivalent to 90·40 per cent. K_2SO_4
1145	Ditto	ditto ditto ...	...	...	...	...	50·52	...	...	...	...	13 18 0	Equivalent to 93·44 per cent. K_2SO_4
934	Ditto (Shirley's)	Paul and Gray, Brisbane ...	·13	...	...	...	52·00	...	...	...	...	14 6 0	Equivalent to 96·19 per cent. K_2SO_4
949	Ditto	Campbell and Amos, Bundaberg	·21	...	...	...	51·80	...	...	...	...	14 5 0	Equivalent to 95·81 per cent. K_2SO_4
1073	Ditto	J. Croker, Mackay	1·70	...	...	...	51·65	...	...	...	...	14 4 0	Equivalent to 95·52 per cent. K_2SO_4
932	Kainite	Webster and Co., Brisbane ...	2·00	...	...	..	12·41	...	...	...	...	3 2 0	
	Simple Fertilisers: Nitrogenous Manures.												
367	Calcium nitrate	Trackson Bros., Brisbane ...	...	...	...	...	...	12·55	...	...	...	10 0 0	Sample shipment
377	Nitro lime	ditto ditto ...	·50	...	...	...	...	16·50	...	...	...	13 4 0	ditto
928	Nitrate of soda	Webster and Co., Brisbane ...	1·42	...	...	...	...	15·68	...	...	...	12 11 0	
943	Ditto	Duffy Bros., Bundaberg ...	1·09	...	...	...	...	15·90	...	...	...	12 14 0	
929	Sulphate of ammonia ...	Webster and Co., Brisbane ...	2·34	...	...	...	...	19·60	...	...	...	14 4 0	
930	Ditto	Paul and Gray, ditto ...	·15	...	...	...	...	20·83	...	...	...	15 2 0	
948	Ditto	Campbell and Amos, Bundaberg	·18	...	...	...	...	20·76	...	...	...	15 1 0	
1071	Ditto	J. Croker, Mackay	1·02	...	...	...	..	20·05	...	...	...	14 10 0	
1074	Ditto	S. A. G. Co., Melbourne (forwarded by Inspector Birkbeck, Mackay)	·87	...	...	...	...	20·20	...	...	...	14 13 0	
1075	Ditto	Shirley's (forwarded by Inspector Birkbeck, Mackay)	·06	...	...	...	...	20·70	...	...	...	15 0 0	

Bone, Blood, Meatworks Manure, Etc.

931	Dried blood (Redbank Works)	Webster and Co., Brisbane	11·53	...	...	...	...	12·58	...	...	...	9	3	0	
776	Dried blood	Birt and Co., Brisbane	10·03	...	...	...	...	12·54	...	...	...	9	2	0	
953	Dried blood. (Q.M.E. Coy's D.B., 112)	Campbell and Amos, Bundaberg	10·91	...	...	...	...	12·25	...	...	...	8	18	0	
1141	Fish manure. (Caloundra Canning Co.)	E. Lissner, Brisbane	6·04	...	...	5·25	...	8·07	...	...	...	7	12	9	
952	Bone meal. (Q'land Fert. Works), Runcorn	Campbell and Amos, Bundaberg	1·78	...	...	25·28	...	3·60	67·0	15·0	18·0	6	8	3	
942	Fertiliser. (Fitzroy)	Wyper Bros., Bundaberg	3·39	...	...	20·81	...	3·86	...	...	...	5	18	6	
1095	Ditto	J. C. Hutton, Brisbane	12·70	...	...	8·70	...	8·53	...	...	...	7	11	0	
951	Ditto (Meat Works)	Campbell and Amos, Bundaberg	4·86	...	...	22·15	...	4·00	...	...	...	6	4	6	Old stock
1025	Ditto	Q.M.E. & A. Co., Eagle Farm, Brisbane	6·74	...	...	12·10	...	6·42	...	...	...	6	9	5	
954	Ditto	C.Q.M.E. Co., Rockhampton	3·62	...	...	18·08	...	4·76	...	...	...	6	3	3	
997	Ditto (Q.M.E. & A. Co's)	Jack and Newell, Cairns	7·08	...	...	9·23	...	7·59	...	...	...	6	17	9	
1056	Ditto	Townsville Meat Works	6·21	...	...	12·42	...	5·84	...	...	...	6	2	0	Taken at Bowen
900	Ditto (Ross River Works)	Q.M.E. & A. Co., Brisbane	4·42	...	...	11·64	...	5·84	...	...	...	5	19	8	
775	Ditto	Birt and Co., Brisbane	3·06	...	...	18·21	...	4·77	...	...	...	6	3	8	
1215	Sheep fertiliser	Ross River Meat Works	6·64	...	...	11·46	...	6·46	...	...	...	...			

Mixed Fertilisers, Superphosphates, &c.

936	Superphosphate	Webster and Co., Brisbane	8·15	16·69	...	16·78	...	...	...	...	...	4	7	5	
950	Ditto	Campbell and Amos, Bundaberg	5·59	18·08	...	18·08	...	...	...	...	...	4	15	0	
937	Basic slag	Webster and Co., Brisbane	·05	...	3·85	11·95	...	...	32·0	...	68·0	2	0	0	Old stock
1214	Ditto	ditto ditto	·05	...	5·29	12·80	...	...	30·0	...	70·0	...			New shipment
922	Shirley's No. 0	Paul and Gray, Brisbane	2·37	5·19	...	13·77	5·95	2·24	...	...	...	5	18	0	
923	Ditto No. 3	ditto ditto	3·60	13·30	...	14·17	1·87	3·36	...	...	...	6	11	6	
945	Ditto No. 3	Duffy Bros., Bundaberg	4·00	13·57	...	14·00	2·14	3·11	...	...	...	6	9	6	
924	Ditto No. 5	Paul and Gray, Brisbane	4·37	10·76	...	11·62	6·51	3·16	...	...	...	7	1	9	
946	Ditto No. 5	Duffy Bros., Bundaberg	4·10	12·85	...	12·97	5·86	3·11	...	...	...	7	5	0	
925	Ditto No. 9	Paul and Gray, Brisbane	2·13	10·33	...	11·12	4·44	5·67	...	...	...	6	14	9	
926	Ditto No. 14	ditto ditto	2·42	7·27	...	18·97	6·25	2·35	...	...	...	7	1	9	
927	Ditto No. 19	ditto ditto	1·76	5·15	...	14·54	3·40	3·26	...	...	...	6	1	8	
944	Ditto £s. d. cane fertiliser	Duffy Bros., Bundaberg	3·20	6·81	...	7·54	6·26	7·15	...	...	...	8	16	6	
996	Ditto special ditto	...	3·98	9·19	...	9·60	6·66	5·17	...	...	...	8	1	0	
947	Fertiliser (M B)	Duffy Bros., Bundaberg	4·10	...	...	23·00	...	1·83	...	...	...	5	10	6	
1070	Mixed fertiliser	J. Croker, Mackay	5·30	7·52	...	7·68	8·72	7·36	...	...	...	9	14	6	
1072	Mackay ditto	T. S. Beatty (agent for Webster and Co.), Mackay	3·82	8·33	...	8·63	15·80	4·55	...	...	...	9	17	6	
998	Oil cake	Yick Lea, Cairns	9·00	...	...	1·21	1·66	7·38	...	...	...	5	19	9	

Animal Pathology.

THE DRUG TREATMENT OF PIROPLASMOSIS IN CATTLE.

In our March issue of the "Journal" we published part of a paper which appeared in the "Veterinary Record" on the curative and preventive treatment of canine piroplamosis, by means of trypanblau. In the issue of that journal of 13th November, 1909, a further paper describes experiments made by Professor G. H. F. Nuttall, M.D., &c.; Quick, Professor of Biology, Cambridge; and S. Hadwen, D.V. Sc. (McGill), First Assistant Pathologist, Health of Animals Branch, Department of Agriculture, Canada, upon the curative treatment of bovine piroplasmosis (Redwater or Texas Fever) by means of trypanblau. We have not space to describe the experiments in detail, but the "Summary and Conclusions" show that:—

1. Trypanblau promises to be an efficient remedy for bovine piroplasmosis, since it exerts a direct and obvious effect upon the parasites.

2. The effect of the drug on *Piroplasma bovis* is similar to that which it produces upon the canine parasite. The dividing forms are the first to disappear, and after a few hours the pyriform parasites also disappear from the peripheral circulation; the parasites which are detected in the blood after a few hours appear degenerated, and rounded or irregular; within nine to forty-five hours or less all the parasites have disappeared from the blood.

3. As in canine piroplasmosis, the disappearance of the parasites from the blood may be temporary. The parasites also disappear and reappear in small numbers (after two to eleven days) in animals undergoing natural recovery. In three treated animals the parasites reappeared in exceedingly small numbers after five or six days; in two, they had not reappeared after sixteen and eighteen days respectively. The animals show no symptoms, and progress towards recovery.

4. It remains to be determined (1) how long the treated cows may contain parasites after the apparent recovery, (2) if the parasites in such recovered animals are altered in virulence, (3) if the parasites are capable of infecting ticks.

5. The experiments were conducted on nine cows, of which four served as controls, and five were treated with tryanblau. Of the controls two suffered from hæmoglobinuria, and one of these died of piroplasmosis; the two other controls had no hæmoglobinuria, and were very mild cases. All of the treated cows had hæmoglobinuria, and recovered. In four of the treated cows hæmoglobinuria occurred before treatment began.

6. As might be expected, the drug exerts a more rapid effect when injected intravenously. The parasites disappear more slowly after subcutaneous injection of the drug. (Judging from our recent experiments on dogs, the giving of the drug *per os* promises to be without effect).

7. Although doses of 150-200 c.c. of a saturated watery solution of the dye were used, it is probable that smaller doses will prove efficient. The drug appears to produce no ill effects on cattle.

8. The drug, being a dye, has the disadvantage of colouring the tissues. How long the colouration persists remains to be determined. In any case, this disadvantage can scarcely weigh in the balance as against saving the life of the animal, especially when used for breeding purposes.

9. We hope that experiments about to be conducted in the field in Africa and elsewhere will demonstrate the value of the remedy in practice.

10. Trypanblau and similar drugs should be given a trial in the treatment of Earçeag in sheep, and Biliary Fever in Horses.

Note.—"100 c.c. boiling water will dissolve 2 grammes of trypanblau, and the solution can be easily filtered. On the other hand, 5 grammes of the dye will not easily dissolve in 100 c.c. of boiling water, and the solution filters badly, part of the dissolved dye separating in the filter; on cooling, the solution forms a gelatinous mass. The 2 per cent. solution, after standing for twenty-four hours, has, for the most part solidified into a gelatinous mass. In the case of 1 per cent. solutions, only a very small amount of the dye separates out after the lapse of twenty-four hours. A ½ per cent. solution remains quite clear after standing for a long time. Owing to the difficulty of obtaining solutions of the dye, and the tendency of the solutions to gelatinise on standing, it appears advisable to prepare the solutions immediately before use, in which case a 2 per cent. solution at blood temperature could be used. As stated, we prepare our solution in the cold, the dye being added in the proportion of 1 to 1.5 per cent. to distilled water. Our solutions did not gelatinise, and there was always a certain amount of dye deposited. The deposit was fine, and was mostly taken up in the syringe and injected with the solution. From a practical standpoint, the 1 per cent. solution appears to suffice, and further experience may show that ½ per cent. solutions are sufficiently effective."

The above note was written by the manufacturers in response to a request for information respecting the deposition of crystals of trypanblau after standing a short time at room temperature, by Professor Nuttall and Hadwen.

Answers to Correspondents.

FRUIT TREES, LUCERNE, AND FLOWERS FOR TAROOM.

C.C.S., Taroom—

(1) What varieties of apple, plum, peach, apricot, figs, citrus fruits, and vines would be suitable to the soil and climate with rainfall:—1908, 28·16 in.; 1909, 25·99 in.? The soil is a black loam, rather heavy, over a yellow clay subsoil at a depth of 2 ft. 9 in. to 3 ft. 10 in.

Answer.—The soil is not good for fruit. It is too heavy, and the drainage bad after heavy rain. Choose some sandy, loamy land, if you have it; but, if not, you might try Japanese Plum, Burbank, Wickson. Apricot: Cullins' Early Peach, Pennant Hills. Fig: Turkey, Large Black Genoa, White Adriatic. Mulberry: Downing's Ever-bearing. Persimmon: Hackeya. Vines: Royal Ascot, Muscat, Gros Colman. Citrus Fruits: These will be very doubtful. The same applies to apples, whilst peaches would be destroyed by the fly.

(2 and 3) Would lucerne do on river flats, black and brown loam, not very heavy, 15 ft. deep, subject to floods, lasting about three days, each flood bringing down a deposit of from $\frac{1}{8}$ to 1 in. of silt? Also, on a box-flat, never flooded, grey, sandy loam, 4 ft. deep?

Answer.—Try lucerne on the alluvial flats. It will stand flooding, but if submerged for three days it might be killed out. Only try a few acres as an experiment. Leave the box flat alone.

(4) A chart showing the monthly and annual rainfall at Taroom may be obtained from the Divisional Meteorological Office, Brisbane.

(1*a*) Flowers: Roses do well on a clay subsoil. March and April are the best months for planting bulbs. See Garden Notes in the "Queensland Agricultural Journal" for February and March. Bulbs might not be too successful on your soil, although we have grown very fine jonquils, narcissus, ixias, dahlias, crinum, freesias, ranunculus, crocus, &c., in soil with a stiff red clay subsoil.

Mr. T. H. Wood, nurseryman, Brisbane, recommends as the best roses for such soil as yours all the Tea and Hybrid Tea Roses, and all English annuals excepting wall flowers, foxglove, cowslip, primroses, and Sweet William.

TO MEASURE MAIZE IN THE CRIB.

SELECTOR, Kin Kin—

Two cubic feet of dry corn on the cob will make 1 bushel of shelled grain. One cubic yard will give $4\frac{1}{2}$ bushels of grain. A crib to hold 800 bushels of shelled corn must have the following dimensions:—20 ft. long, 10 ft. broad, 8 ft. high. The volume of such a crib is $20 \times 10 \times 8 = 1{,}600$ cubic feet. Divide by 2, and you have 800, or the number of bushels of shelled grain.

C.C., MOOLOOLAH.—

ITCH IN HORSES—LAMPAS IN HORSES.

ITCH IN HORSES.

This is apparently so-called "Queensland Mange." Give affected horses once daily for seven or nine days, 1 oz. Epsom salts, $\frac{1}{2}$ oz. sulphur, $\frac{1}{2}$ oz. bicarbonate of soda; mixed in the food.

The skin should be washed with soft soap and warm water, then dried, and the following mixture well rubbed in once daily:—Sulphur, 4 oz.; spirit of tar, $\frac{1}{2}$ oz.; linseed oil, 1 pint. Shake well before using.

"LAMPAS" IN HORSES.

The blood requires purifying. The above powder, given as directed, will bring about recovery without lancing or burning the gums.

FLANDERINE ESCUTCHEON AND JERSEY-HEREFORD CATTLE.

Jersey-Hereford, North Coast Line—

In reference to your inquiry concerning the term "Flanderine escutcheon," Mr. P. R. Gordon explains that the term is not used amongst breeders of dairy cattle, but always the "Guenon escutcheon," the name of the man who first observed it and connected it with good milking qualities in cattle. In milking breeds of cattle, a portion of the "twist," on back parts of the thighs on either side of the tail, has the hair shed in a different direction to that on the other parts of the body. That is the escutcheon. It is even of more importance in a bull than in the cow, as indicating that the bull comes from a good stock of milking family, hence Mr. Gordon allotted 10 points to the bull and only 5 to the cow in my schedule of points. . . . The escutcheon will be found fully described in any work on dairy stock. *Re* the Jersey-Hereford cross: The Hereford is an essentially beef breed of cattle, and when an occasional odd one is found to be a good milker, it would be what Mendel terms a "Mutation"—a change either in form or quality. These mutations, when they do occur, are hereditary. But (?) was Mr. Munro Hall's cow from Kenilworth Station a pure Hereford, or only what the majority of Hereford herds are here—*i.e.*, graded up on Shorthorn blood? If the latter, the milking qualities would have been inherited from her Shorthorn ancestors. But 17 lb. of milk per day would be considered but a very poor return in a dairy herd. As milking qualities are inherited, it would not be advisable to commence building up a dairy herd on a beef breed foundation.

STABLES AND COWSHEDS.

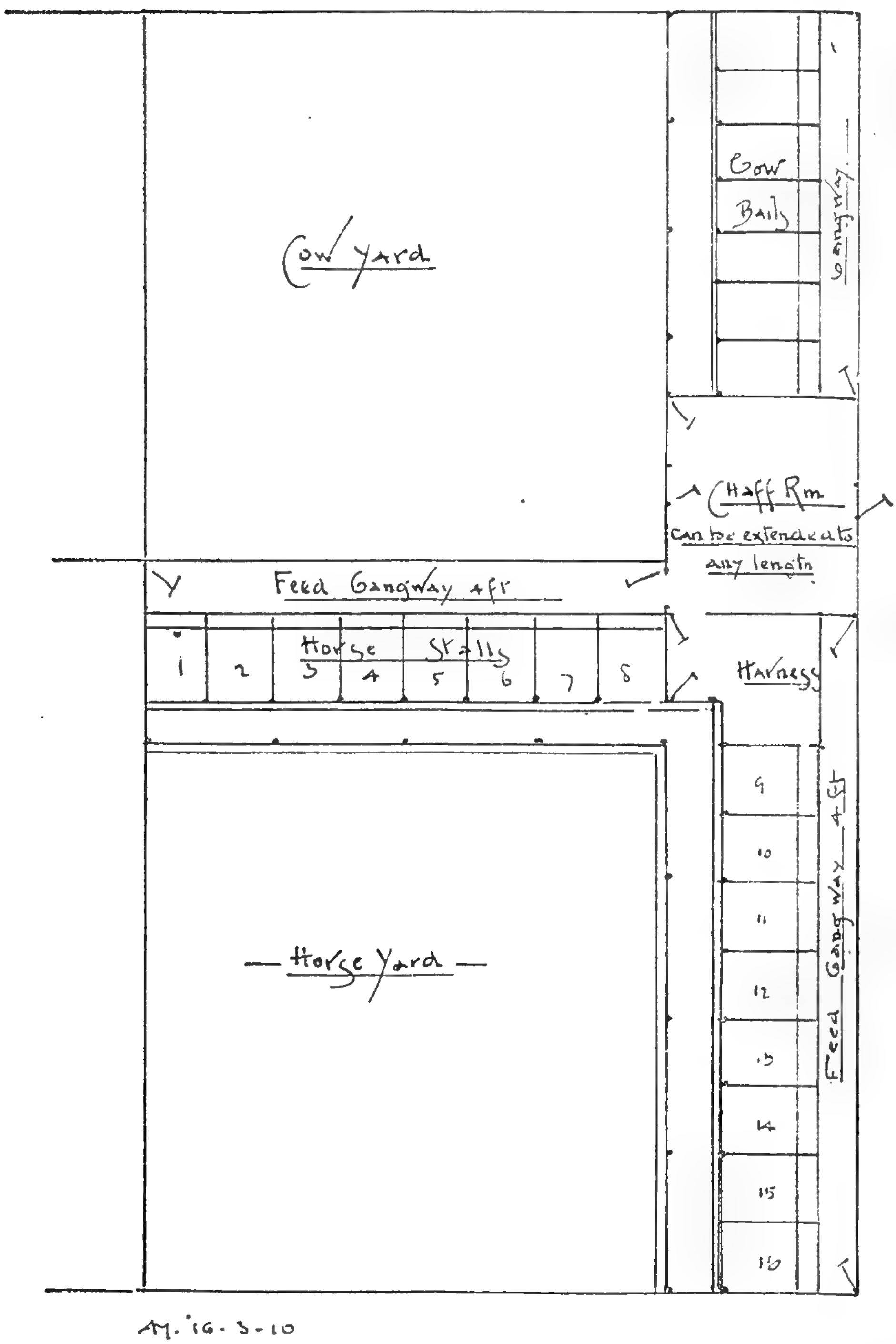
The following reply to the inquiry of Mr. E. S. Waller, of Macknade, may be of some general use:—

The best plan for a stable for sixteen horses and for a milking shed for seven or eight cows cannot be stated generally, as so much depends on local conditions and surroundings; the contour of the ground, prevailing winds, and general aspect are all factors which should be considered in planning buildings for farm animals. A good plan, however, which may be suitable in this case, is shown in the accompanying diagram, in which the buildings are placed contiguous to each other, with one general chaff-room in the centre, which may be extended as desired, and a harness-room for stables in addition. It will be seen that gangways are provided in each case in front of the animals for feeding purposes, communicating direct with the chaff-room, and the yards are separated by a wing of the stable. It is impossible to estimate the cost of such a plan without full information as to the district quotations for materials.

A good floor for horse-stalls—that is, for the standing space—may be made of good hardwood sawn or squared like railway sleepers laid on a fine bed of hard material, such as stone grouted in with sand, with 3 in. of sand on top, and the joints between each piece run in with hot tar mixed with lime and sand, to prevent percolation of animal liquids. Behind the horses, where a good drain should be constructed to carry off any liquids, concrete is undoubtedly an excellent material to use. A surface drain of concrete should run along the back of the stalls, and be conducted to a suitable outlet.

For cow-sheds, an excellent floor for cleansing purposes and for saving all manure, solid and liquid, is cement concrete, laid about 4 in. thick, in the proportion of 6 parts of river gravel to 1 of cement, and finished on top with a rammer, without any further coating, except the use of the wood float to fill up any inequalities.

DIAGRAM SHEWING SUGGESTED ARRANGEMENT FOR STABLES AND COW SHED COMBINED



The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	MARCH. Prices.
Apples (Eating), per case	4s. to 7s. 6d.
Apples (Cooking), per case	2s. 6d. to 4s.
Bananas (Cavendish), per dozen	$1\frac{1}{2}$d. to 2d.
Bananas (Sugar), per dozen	2d. to 3d.
Cherries, per quarter-case	...
Grapes (Hamburg), per lb.	2d. to $2\frac{1}{2}$d.
Grapes (Sweetwater), per lb.	$1\frac{1}{2}$d. to 2d.
Lemons (Italian), per large case	17s. to 18s.
Lemons (Local), per case	4s. 6d. to 6s.
Mangoes, per case	1s. $0\frac{1}{2}$d. to 4s.
Nectarines, per quarter-case	1s. to 3s.
Oranges (Italian), per large case	18s. to 20s.
Oranges (Local), per case	2s. 6d. to 5s.
Papaw Apples, per quarter-case	1s. to 2s.
Passion Fruit, per quarter-case	1s. to 4s. 6d.
Peaches, per quarter-case	1s. 6d. to 2s. 9d.
Pears, per case	4s. 6d. to 6s.
Persimmons, per case	1s. to 4s.
Pineapples (Ripley Queen), per dozen	8d. to 3s. 6d.
Pineapples (Rough), per dozen	8d. to 3s. 3d.
Pineapples (Smooth), per dozen	1s. 8d. to 3s. 6d.
Plums, per quarter-case	1s. 5d. to 4s. 6d.
Quinces, per case	2s. to 4s. 6d.
Rock melons, per dozen	1s. to 2s.
Tomatoes, per quarter-case	1s. 6d. to 2s. 6d.

SOUTHERN FRUIT MARKET.

Apples (Local), per case	12s. to 15s.
Apples (Nelson's), per case	7s. to 8s.
Apples (Cooking), per case	5s. to 6s.
Apricots, per quarter-case	2s. 6d. to 3s.
Bananas (Queensland), per case	6s. to 6s. 6d.
Bananas (Queensland), per bunch	1s. 6d. to 2s. 6d.
Bananas (Fiji), per case	10s. 6d. to 11s. 6d.
Bananas (Fiji), per bunch	3s. to 8s.
Cocoanuts, per dozen	1s. 9d. to 2s. 6d.
Gooseberries, per half-bushel case	...
Grapes (Queensland, White), per 12 lb. box	1s. to 2s.
Lemons (Italian), per half-case	10s. to 20s.
Lemons (Local), per gin case	6s. to 7s.
Nectarines, per half-case	3s. 6d. to 4s.
Oranges (Local), per case	14s. to 16s.
Oranges (Italian), per case	9s. to 10s.
Passion Fruit (Choice), per half-case	3s. to 3s. 6d.
Peaches, per half-case	2s. 6d. to 3s. 6d.
Pears, per packer	4s. 6d. to 6s.
Peanuts, per lb.	$5\frac{1}{2}$d.
Pineapples (Queensland), Ripley, per case	5s. to 6s.
Pineapples (Queensland), Common, per case	5s. to 6s.
Pineapples (Queensland), Queen's, Choice, per case	5s. to 5s. 6d.
Plums, per gin case	2s. 6d. to 3s.
Quinces, per case	3s. to 4s.
Rock melons, per dozen	2s. 6d. to 4s.
Tomatoes, per half-case	3s. to 3s. 6d.
Water melons (Queensland), large, per dozen	6s. to 7s.
Water melons (Queensland), medium, per dozen	3s. to 4s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MARCH.

Article.		MARCH. Prices.
Bacon, Pineapple	lb.	7½d. to 10½d.
Barley, Malting	bush.	3s. to 3s. 6d.
Bran	ton	£4 2s. 6d.
Butter, Factory	cwt.	104s.
Chaff, Mixed	ton	£3 10s. to £4 10s.
Chaff, Oaten	,,	£4 10s. to £5 5s.
Chaff, Lucerne	,,	£3 to £4
Chaff, Wheaten	,,	£2 10s. to £2 15s.
Cheese	lb.	2d. to 4½d.
Flour	ton	£10 15s. to £11.
Hay, Oaten	,,	£5 15s.
Hay, Lucerne	,,	£1 15s. to £3
Honey	lb.	2½d.
Maize	bush.	3s.
Oats	,,	3s. 1d. to 3s. 8d.
Pollard	ton	£4 7s. 6d.
Potatoes	,,	£2 10s. to £7 5s.
Potatoes, Sweet	cwt.	1s. 3d. to 1s. 8d.
Pumpkins	,,	4s.
Wheat, Milling	bush.	2s. 1d. to 4s. 3d.
Wheat, Chick	,,	...
Onions	ton	£5 10s.
Hams	lb.	11½d. to 1s. 1½d.
Eggs	doz.	1s. to 2s. 6d.
Fowls	pair	2s. 6d. to 4s. 3d.
Geese	,,	5s. 6d. to 6s.
Ducks, English	,,	3s. to 5s.
Ducks, Muscovy	,,	3s. to 5s.
Turkeys (Hens)	,,	5s. to 6s. 6d.
Turkeys (Gobblers)	,,	9s. to 14s.

ENOGGERA SALEYARDS.

Animal.	MARCH. Prices.
Bullocks	£7 2s. 6d. to £8 12s. 6d.
Ditto (single)	£10 5s.
Cows	£6 to £7 7s. 6d.
Merino Wethers	16s. 6d.
Crossbred Wethers	16s. 9d.
Merino Ewes	15s. 6d.
Crossbred Ewes	13s. 4d.
Lambs	10s. 6d.

Orchard Notes for May.

By ALBERT H. BENSON, M.R.A.C.

The Southern Coast Districts.

The advice that I have given respecting the handling and marketing of citrus fruits in the last two numbers of this Journal applies with equal force to this and the following months. Do not think that you can give the fruit too much care and attention; it is not possible, as the better they are handled, graded, and packed the better they will carry, and the better the price they will realise.

Continue to pay careful attention to specking, and fight the blue mould fungus everywhere. Don't let mouldy fruit lie about on the ground, hang on the trees, or be left in the packing shed, but destroy it by burning. Keep a careful look-out for fruit-fly, and sweat the fruit carefully before packing. If this is done, there be little fear of the fruit going bad in transit, or being condemned on its arrival at Southern markets. Where the orchard has not been already cleaned up, do so now, and get it in good order for winter. Surface working is all that is required, just sufficient to keep moisture in the soil; keep down undergrowth, and prevent the packing of the surface soil by trampling it down when gathering the fruit.

Keeping the orchard clean in this manner enables any fallen fruit to be easily seen and gathered, and I need hardly state what I have mentioned many times before, that diseased fruit should on no account be allowed to lie about and rot on the ground, as this is one of the most frequent causes of the spreading of many fruit pests.

May is a good month to plant citrus trees, as if the ground is in good order they get established before the winter, and are ready to make a vigorous growth in spring.

Don't plant the trees, however, till the land is ready, as nothing is gained thereby, but very frequently the trees are seriously injured, as they only make a poor start, become stunted in their growth, and are soon overtaken by trees planted later, that are set out under more favourable conditions. The land must be thoroughly sweet, and in a good state of tilth—that is to say, deeply worked, and worked down fine. If this has been done it will probably be moist enough for planting, but should there have been a dry spell, then when the hole has been dug and the tree set therein, and the roots just covered with fine top soil, four to eight gallons of water should be given to each tree, allowed to soak in, and then covered with dry soil to fill up the hole. In sound, free sandy loams, that are naturally scrub, holes may be dug and the trees planted before the whole of the ground is brought into a state of perfect tilth. It is, however, better to do the work prior to planting, as it can then be done in the most thorough manner; but if this is not found possible, then the sooner it is done after planting the better. If the land has been thoroughly prepared, there is no necessity to dig big holes, and in no case should the holes be dug deeper than the surrounding ground either is or is to be worked. The hole need only be big enough to allow the roots to be well spread out, and deep enough to set the tree at the same depth at which it stood when in the nursery. Plant worked trees 24 to 25 ft. apart each way, and seedlings at least 30 ft. apart each way.

Towards the end of the month cover pineapples when there is any danger of frost; dry blady grass or bush hay is the best covering. Keep the pines clean and well worked; first, to retain moisture; and, secondly, to prevent injury from frost; as a patch of weedy pines will get badly frosted when a clean patch alongside will escape without any serious injury.

Slowly acting manures—such as meatworks manure when coarse, boiling-down refuse, farm manure or composts—may be applied during the month, as they will become slowly available for the trees' use when the spring growth takes place, but quickly-acting manures should not be applied now.

TROPICAL COAST DISTRICTS.

May is a somewhat slack month for fruit—pines, papaws, and granadilas are not in full fruit, the autumn crop of citrus fruit is over, and the spring crop only half-grown. Watch the young citrus fruit for Maori, and when it makes its appearance spray with the sulphide of soda wash. Keep the orchard clean, as from now till the early summer there will not be much rain, and if the orchard is allowed to run wild—viz., unworked and dirty—it is very apt to dry out, and both the trees and fruit will suffer in consequence.

Bananas should be kept well worked, for this reason, and though the fly should be slackening off, every care must still be taken to prevent any infested fruit being sent to the Southern markets.

Citrus fruits can be planted during the month, the remarks *re* this under the heading of the Southern Coast Districts being equally applicable here.

SOUTHERN AND CENTRAL TABLELANDS.

Get land ready for the planting of new deciduous orchards, as although there is no necessity to plant so early, it is always well to have the land in order, so as to be ready to plant at any time that the weather is suitable. The pruning of deciduous trees can commence towards the end of the month in the Stanthorpe district, and be continued during June and July. It is too early for pruning elsewhere, and too early for grapes, as a general rule. Keep the orchard clean, particularly in the drier parts. In the Stanthorpe district I recommend the growing of a crop of blue or grey field peas, or a crop of vetches between the trees in the older orchards, as a green manure. The crop to be grown as a green manure should have the soil well prepared before planting, and should be manured with not less than 4 cwt. of phosphatic manure, such as Thomas phosphate, or fine bone-dust, per acre. The crop to be ploughed in when in the flowering stage. The granitic soils are naturally deficient in organic matter and nitrogen, as well as phosphoric acid, and this ploughing in of a green crop that has been manured with a phosphatic manure will have a marked effect on the soil.

Lemons will be ready for gathering in the Roma, Barcaldine, and other districts. They should be cut from the trees, sweated, and cured down, when they will keep for months, and be equal in quality to the imported Italian or Californian fruit. If allowed to remain on the trees, the fruit becomes over-large and coarse, and is only of value for peel. Only the finest fruit should be cured; the larger fruit, where the skin is thicker, is even better for peel, especially if the skin is bright and free from blemish; scaly fruit, scabby, warty, or otherwise unsightly fruit is not suitable for peel, and trees producing such require cleaning or working over with a better variety, possibly both.

The remarks *re* other citrus fruit and the work of the orchard generally that I made when dealing with the coast districts, apply equally well here, especially as regards handling the crop and keeping down pests.

Farm and Garden Notes for May.

Field.—During this month the principal work in the field will be the sowing of wheat, barley, oats, rye, and vetches. There is no time to lose now in this work. Potatoes should be hilled up. Cut tobacco. The last of the cotton crop should now be picked, the bushes being stripped daily after the dew has evaporated. Growers are notified that cotton-ginning machinery has been installed by Messrs. Kitchen and Sons, in the Valley, Brisbane, so that a sure means of disposing of the crop is available (*see* "Journal" of 1st March, 1906). Every effort should be made to ensure feed for stock during the winter by utilising all kinds of green fodder, in the form of silage or hay. Those who own dairy stock will be wise to lay down permanent grasses suitable to the climate and to their particular district and soil. A few acres of artificial grass will support a surprisingly large number of cattle or sheep in proportion to acreage. Couch grass in the West, as has been proved at Barcaldine, will carry ten or twelve sheep to the acre. Coffee-picking should now be in full swing, and the berries pulped as they are picked. Strawberries may be transplanted. The best varieties are Pink's Prolific, Aurie, Marguerite, Hautbois, and Trollope's Victoria. The Aurie is the earliest, and the Marguerite next. In some localities strawberry planting is finished in March, and the plants bear their first fruits in August. In others, fruit may be gathered in July, and the picking does not end until January.

Kitchen Garden.—Onions which have been planted in seed beds may now be transplanted. The ground should have been thoroughly cleaned, pulverised, and rolled previous to transplanting. Onions may still be sown in the open on clean ground. In favourable weather plant out cabbages, cauliflowers, lettuce, leeks, beetroot, endive, &c. Sowings may also be made of all these, as well as of peas, broad beans, kohl-rabi, radishes, spinach, turnips, parsnips, and carrots. Dig and prepare beds for asparagus.

Flower Garden.—Transplanting and planting may be carried out simultaneously during this month in showery weather; the plants will thus be fully established before the early frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, pen-stemons, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia roots should be taken up and placed in a shady situation out of doors. Plant bulbs, such as anemones, ranunculus, snowflakes, freesias, ixias, iris, narcissus, &c. Tulips and hyacinths may be tried, but success in this climate is very doubtful. All shades and screens may now be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

Agriculture.

VARIETY ON THE STOCK FARM.

In these days farmers who specialise in one particular branch of live stock, and thus become experts in the art of selecting and breeding that kind, are the most likely to achieve distinction and perhaps fame; but, after all, one wonders whether the farmer who has invested his capital and devotes his energies to several kinds of stock is not, in some cases, in a safer position, seeing that prices and seasons are constantly changing, so that one kind is up and the other down in values.

Take sheep for instance. For many years they were the sheet-anchor of ploughed-land farmers, and those with a good flock averaging a sheep to the acre were looked upon as substantial men who could stand the severest financial strain that the most adverse season could impose upon them. To-day it is noticed that some of them find it advisable to add milk selling to their sheep breeding, and a visit to their homesteads cannot be made without hearing or seeing milk churns, a sure sign that the dairy cow is not neglected, even if sheep are given first place. Other flockmasters have recently invested in a few pedigree Shire horses, and are among the successful exhibitors of young stock bred from them. They are certainly on the right track, seeing that the draught horses they breed tend to make the farm self-supporting in its supply of team horses, and there is always a market for serviceable workers five to six years old after their farm apprenticeship is over.

The milk-selling farmer has been accused of robbing his farm by sending his milk away, and not keeping pigs and other stock to consume it and make manure, but that contention does not find much support in these days. There are various excellent fertilisers for grass land, and liberal application in the autumn more than compensates for any loss to the dairy pastures through the milk being sent away. Then substitutes make it possible to wean calves on a minimum quantity of milk, although it may be that many milk sellers do not take the trouble to wean, and consequently using low grade bulls for the simple reason that the stock they beget will go into other herds than their own. There others who make a point of keeping a good bull and saving the heifer calves from their best cows to come into their own herd, and this is the true way to level up a herd and increase its milk-producing capacity, an aim which should ever be in the minds of those who keep dairy cows.

There is at least one other kind of the farm's live stock which should not be neglected, especially when shed corn is abundant and cheap bulks may be purchased, and that is poultry. A flock of turkeys on the stubbles pick up their living and prepare themselves for the Christmas markets on food which would otherwise be more or less wasted, while fowls in portable houses are by no means to be despised as helpers in the task of making farming pay.

In order to secure a constant income with which to pay labour, cost of living, and current expenses, it is desirable to possess live stock of several kinds, so that if one is contributing less to the general exchequer another may, to some extent, make it up, and thus do away with the need for turning labourers adrift and neglecting necessary work, such as the care of fences and the cleansing of ditches. If the interests are varied there is no reason why the horse lover should not try to excel with his favourites, or the cattle or sheep man to develop his herd or his flock, but the prevailing conditions and prices in many cases favour the all-round stock farm.—"Live Stock Journal."

16

Dairying.

NEW MILKING MACHINE.

A milking machine which has been a great success with small farmers in Sweden has been referred to lately in the English Press. It is made there, and can be worked by hand, which, of course, is a great advantage in a small farm. It is suspended by means of two broad straps, one just behind the shoulder and the other over the loin of the cow. There is the usual vacuum vessel for holding the milk. Detachment-suction, or rather in this case the result, is obtained by compression, the teat being inserted in a cup-like receptacle, one side of which, actuated by a piston, allows the teat to fill and then presses it, much after the method of the human fingers. All four teats are milked simultaneously, or the valves can be shut off to allow of milking cows that have lost one or more quarters. The machine strips clean, and can be worked easily by one man.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF FEBRUARY, 1910.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Whitefoot ...	Holstein-Devon ...	2 Oct., 1909	977	4·1	44·82	
Conceit ...	Ayrshire	22 Nov. ,,	981	4·0	43·84	
Lark ...	,, ...	14 Aug. ,,	878	3·8	37·17	
Auntie ...	,, ...	23 Aug. ,,	767	4·3	36·98	
Cocoa ...	Jersey	15 Sept. ,,	678	4·7	35·88	
Lady Kelso	Shorthorn ...	2 Oct. ,,	785	4·0	35·08	
Rosalie ...	Ayrshire	3 Jan., 1910	827	3·8	35·01	
Lerida ...	,, ...	26 Jan. ,,	827	3·7	34·04	
Orange ...	Guernsey-Shorth'n	13 Dec., 1909	684	4·4	33·78	
Peewee ...	Grade Holstein ..	29 Aug. ,,	742	4·0	33·15	
No. 112 ...	Grade Jersey ...	25 Dec. ,,	710	4·1	32·56	
Gem ...	Shorthorn	22 Jan., 1910	725	4·0	32·40	
Chocolate ...	,, ...	15 June, 1909	703	4·0	31·42	
Eve ...	Jersey	1 Nov. ,,	604	4·5	30·55	
Lavina's Pride	Ayrshire	9 Nov. ,,	677	4·0	30·25	
Len ...	,, ...	3 Oct. ,,	714	3·8	30·22	
Dewdrop ...	Holstein	1 Nov. ,,	755	3·6	30·20	
Restive ...	Shorthorn... ...	30 Oct. ,,	649	4·0	29·00	
Night ...	Grade Holstein ...	23 Sept. ,,	696	3·7	28·64	
Daisy ...	Holstein	29 Dec. ,,	839	3·1	28·61	
Honeycombe	Shorthorn ...	11 April ,,	621	4·0	27·75	
Rhoda ...	Grade Shorthorn	3 Aug. ,,	637	3·9	27·71	
Burton's Lass	Shorthorn ...	14 Sept. ,,	620	4·0	27·71	
Ethel ...	Holstein-Shorth'n	9 Oct. ,,	635	3·9	27·62	
Tiny ...	Jersey	15 Sept. ,,	477	5·1	27·48	
Lass ...	Ayrshire	15 June ,,	582	4·2	27·35	
Bliss ...	Jersey	5 Oct. ,,	557	4·3	26·85	
Comet ...	Grade Holstein ...	14 Nov. ,,	691	3·5	26·81	
Bluebell ...	Jersey	29 Jan., 1910	611	3·9	26·58	
Redrose ...	Shorthorn... ...	21 Sept., 1909	592	4·0	26·45	
Dot ...	,, ...	1 Nov. ,,	588	4·0	26·27	
Lady Ring	Guernsey	23 Jan. ,,	380	5·8	25·89	

Fed on natural pasture only.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON—*continued.*

RECORD OF COWS FOR MONTH OF MARCH, 1910.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Carrie ...	Jersey	26 Feb., 1910	766	4·4	37·83	
Orange ...	Grade Guernsey ...	13 Dec., 1909	687	4·6	35·55	
Gem ...	Shorthorn ...	22 Jan., 1910	758	4·1	34·76	
No. 112 ...	Grade Jersey ...	25 Dec., 1909	718	4·3	34·62	
Poppie ...	Grade Guernsey ...	10 Feb., 1910	646	4·3	31·14	
Bluebell ...	Jersey	29 Jan. ,,	625	4·3	30·14	First calf
Lerida ...	Ayrshire	26 Jan. ,,	757	3·6	30·28	
Rosalie ...	,, ...	3 Jan. ,,	717	3·7	29·51	
Patch ...	Grade Shorthorn	29 Nov., 1909	692	3·7	28·48	
Bliss ...	Jersey	5 Oct. ,,	564	4·5	28·52	
Lady Kelso ...	Shorthorn ...	2 Oct. ,,	667	3·8	28·24	
Daisy ...	Holstein	29 Dec. ,,	769	3·3	27·92	
Careless ...	Jersey	27 Sept. ,,	566	4·3	27·28	
Peewee ...	Grade Holstein ...	29 Aug. ,,	600	4·0	26·82	
Dora ...	Shorthorn ..	29 Nov. ,,	596	4·0	26·63	
Dot ...	,, ...	1 Nov. ,,	611	3·9	26·58	
Ethel ...	Grade Holstein ...	9 Oct. ,,	594	4·0	26·52	
No. 6 ...	Shorthorn ...	19 Nov. ,,	647	3·6	25·88	
Bee ...	Jersey	23 Dec. ,,	521	4·4	25·87	
Eve ...	,, ...	1 Nov. ,,	548	4·2	25·77	
Burton's Lass	Shorthorn ...	14 Sept. ,,	572	4·0	25·55	First calf
Bangle ...	,, ...	26 Dec. ,,	600	3·8	25·41	
Comet ...	Grade Holstein ...	14 Nov. ,,	617	3·7	25·39	
Cheerful ...	Shorthorn ...	4 July ,,	526	4·3	25·35	
Vixen ...	,, ...	28 Dec. ,,	595	3·7	24·48	
Cocoa ...	Jersey	12 Sept. ,,	602	3·6	24·08	
Laura ...	Ayrshire	16 Oct. ,,	567	3·8	24·00	
Dewdrop ...	Holstein	1 Nov. ,,	635	3·4	23·88	
Redrose ...	Shorthorn ...	21 Sept. ,,	520	4·0	23·24	First calf
Glen ...	Grade Shorthorn	28 Jan. ,,	418	4·9	23·10	
Primrose II.	Shorthorn ..	20 Jan., 1910	577	3·6	23·08	First calf

Pastured on natural grasses only.

LINCOLNSHIRE CURLY-COATED PIGS.

Mr. P. R. Gordon, referring to this class of swine, writes:—

"Doubtless many readers of your Journal will have noticed, in reading the results of the block tests at the late Smithfield Show, that the Lincoln Curly-Coated Pig distanced all other breeds, not only in the carcass competition, but also in price per lb. at the auction sales. It is but within the last few years that a breed society has been established to look after its interests; but now there is no breed of pigs that has made more rapid strides in public favour, and in no other country can be found better ham and bacon than in Lincoln, the home of this pig. Curiously enough it was Germany and Hungary that first duly appreciated the value of this great bacon pig."

Mr. John Mahon, Principal of the Queensland Agricultural College, is an acknowledged authority on all breeds of pigs, and no doubt, during his visit to England, the merits or otherwise of the Curly-Coated Lincolnshire breed will not be unnoticed by him.—Ed. "Q.A.J."

POINTS OF MERINO SHEEP.

P. R. GORDON.

For the purposes of this paper, the class of sheep selected for pointing is what is known as "Medium Combing Merinos." This description of sheep has been selected for the reason that about one-half of the merino sheep in Australia are of the semi-fine or medium class merinos, and this, not from mere choice on the part of breeders, but because the country on which they are pastured is best adapted to the growth of that class of wool. It must not be assumed that the term "medium" infers inferiority. It means length of staple and diameter of wool-fibre compared with the fine and strong merinos, and for medium merino wool there is a more extensive market than for any other description of merino. Although this scale is specially arranged for medium combing, it can be adapted to the two other descriptions by reducing the points for "size" and length of staple for fine and increasing those for softness and fineness, for strong merinos. It has been objected to point judging of merinos that, although it answers well as to externals, there is that of very great importance, which cannot be relatively expressed in numbers, and which none but a first-class judge of long experience can determine—namely, a ram's impressiveness as a sire. This is, to a great extent, true; but it has to be borne in mind that the services of such men as judges at shows are very difficult indeed to secure, and that all breeders, and especially beginners, for whom this scale is specially intended, have not been born breeders. The objection is, to a great extent, met in the following schedule by allotting 50 points for breeding and quality in the 3 points "Pedigree," "Offspring," and "Symmetry, form," &c., supplemented by 20 points allotted the various points of the head. The first three numbers in the scale cannot be represented by the diagram. It is necessary to state that the accompanying diagram, as with all the preceding ones, are copies of those illustrating the late Mr. Bruce's many contributions on the subject.

The following are the points, and their relative values:—

RAM.

1. "Pedigree."—According to standing in Stud Book, or as proved by certificates and declaration, and—for breeders—the position the wool has taken in the markets of the world—20 points.

2. "Offspring."—To be viewed from the character of the offspring, as shown by their success at shows or at sales—20 points.

3. "Symmetrical Form and proper complexion and covering—10 points.

4. "Countenance."—The forehead should be broad, and the countenance healthful—5 points.

5. "The Eyes" should be bright and placid, and free from spots—3 points.

6. "The Muzzle," &c.—The muzzle should be clean, the nostril expanded, and the nose white, wrinkly, and covered with short, furry, soft velvety hair—5 points.

7. "The Ears" should be white, soft, thick, wide apart, and partly covered with wool—3 points.

8. "The Horns" should not be too close to the head and neck, nor standing out too widely, and free from black or dark streaks—4 points.

9. "The Neck" should be short on the top, deep when viewed from the side, and long below, strongly set to the head and shoulders, towards which it should be becoming deeper—5 points.

10. "The Shoulders" should be broad and massive as to depth and breadth, very little, if any, above the level of the back, and well placed—4 points.

11. "The Chest" should be wide and deep—4 points.

12. "The Skin" should be thick, soft, and pink—2 points.

13. "The Barrel" should be round and lenthy—6 points.

14. "The Back" should be short, level, strong, and straight—5 points.

15. "The Loin" should be broad and strong—4 points.

16. "The Flank" should be deep and straight—4 points.

17. "The Quarters" should be long and well filled up—4 points.

18. "The Thighs" should be long and broad—2 points.

19. "The Legs."—The forelegs should be short, straight, and well apart, and the hind legs should be set so as to give the hind parts a perpendicular appearance; while the bone should be heavy, but of fine texture—5 points.

20. "The Muscle" should be fine and firm—2 points.

21. "The Hoofs" should be clear in colour and well shaped—3 points.

22. "Size."—According to the class of sheep—5 points.

23. "Length of staple."—According to the Division—5 points.

24. "Density."—Closeness and thickness all over, but especially on the top of the shoulder and back—30 points.

25. "Evenness."—In length and density of fleece over the whole body, legs, belly, back, and head—20 points.

26. "Brightness," including "Lustre," denotes facility for taking delicate dyes—5 points.

27. "Softness."—Soft and silky to the touch, but elastic—8 points.

28. "Crimp."—The regularity of the waves and trueness of the fibre—7 points.

29. "Freedom from Gare," *i.e.*, "Kemp"—5 points.

30. "Fineness."—According to Division—17 points.

31. "Freeness."—Denoting few noils in combing, and including building up of staple—6 points.

32. "Evenness."—In the quality of the fleece over the whole body, legs, belly, back, and head—17 points.

33. "Condition."—Quantity of yolk—3 points.

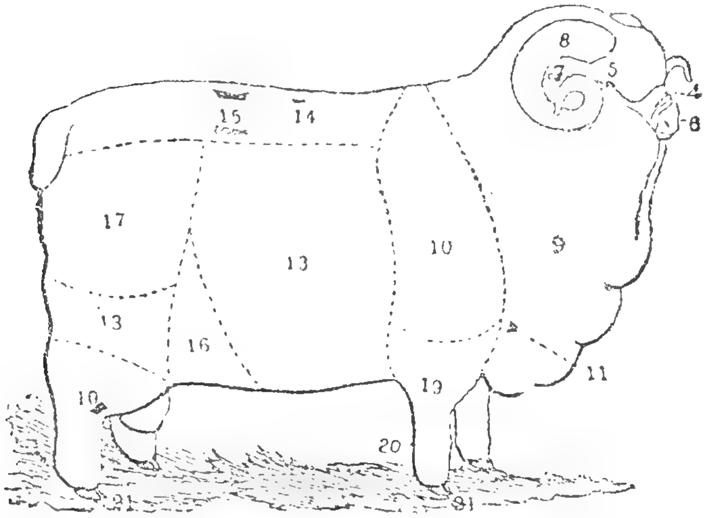
34. "Fluidity of Yolk"—2 points.

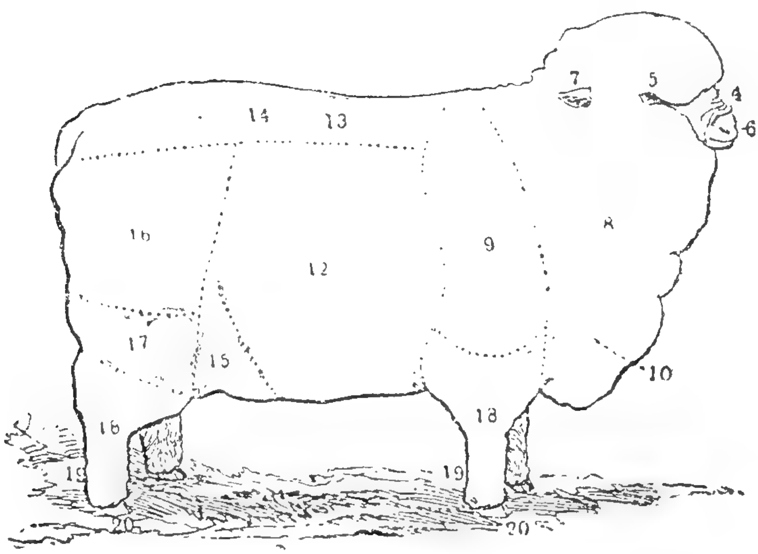
SUMMARY.

Breeding and quality, Nos. 1, 2, and 3	50	points
Head, Nos. 4 to 8	20	,,
Form and constitution, Nos. 9 to 12...	15	,,
Middle, Nos. 13 to 15...	15	,,
Hind quarter, Nos. 16 to 18	10	,,
Legs, feet, &c., Nos. 19 to 21...	10	,,
Size, No. 22	5	,,
Wool—quantity, Nos. 23 to 25	55	,,
Quality, Nos. 26 to 32	65	,,
Condition—Yolk and Fluidity	5	,,
Aggregate	250	,,

The points for ewes are the same as those for rams, with the following exceptions:—The marks for "Muzzle" in ewes are 4 instead of 5. Those for horns are omitted. Five marks are added for "Evenness of covering."

Points of a Medium Combing Merino Ram and Ewe.





The above plates represent a Medium Combing Merino Ram and Ewe, with the points of form approximately indicated on the plates, the numbers appearing on it corresponding with those given on preceding pages in describing the points and setting out their relative values.

SHORT-WEIGHT BUTTER CONSIGNMENTS.

Mr. E. Graham, Government Dairy Expert, in a report on this subject to the Under Secretary, Department of Agriculture and Stock, says:—

The percentage of short-weight butter consignments coming to hand is abnormally high. So serious is the position that it may be well to review the chief causes of this fault.

By far the greatest danger of submitting short-weight parcels lies in the churning of cream at a high temperature, working the resultant butters *once*, combined with a tendency to maintain a high-moisture content. Consignments have arrived with water freely escaping from the boxes. These boxes may have contained full weight when packed at the factory, but, owing to the leakage, fall short when weight is checked at this end. Probably the butter was churned from cream the cooling of which was not sufficiently thorough, and with one working the moisture in the butter is not retained because of its not being properly incorporated with the butter fat. Butters of this nature fall into the category of "open texture," "free moisture" butters, and give little satisfaction generally. Not only do the factories render themselves liable to a short-weight penalty, but there is also a risk that boxes drawing full-weight in Brisbane, when graded, will subsequently leak sufficiently to be short-weight when shipped.

Some of the faulty weight boxes are precisely 1 lb. short. This suggests that there is occasionally an error in making allowance for the weight of the empty box when packing the butter.

Other factories do not weigh the empty boxes, but fill the required quantity of butter direct from the scales. This system would be much more accurate if the butter were placed on the bare weighing platform, and not on the usual wooden tray. The tray is weighed at the commencement of the work and allowance made for its weight. It is then dry, but as the work continues the wooden tray is constantly absorbing moisture, and latterly weighs more than the weight allowed for, the result being short-weight packages.

The scales at the various cold stores have been recently re-examined, and are regularly examined by the council authorities, and dead weights are used at least daily for testing purposes, thus it is considered the weighing at this end is accurate. Similar precaution is necessary at the factory in order that short-weight consignments may be avoided and the need for present penalties removed.

It is expected that by giving attention to the various causes enumerated below the object in view will be attained:—

1. Churning the cream at correct temperature and taking care not to overchurn;
2. Working the resultant butter twice;
3. Not allowing too high percentage of water to remain in the butter;
4. Exercising more care in weighing of boxes and in allowing for weight of same when packing;
5. By discontinuing the use of a wooden tray on the scales;
6. Taking precaution necessary to ensure scales are working correctly.

PLEURO-PNEUMONIA VIRUS.

For the information of stockowners, it is announced that PURE CULTURE PLEURO-PNEUMONIA VIRUS for protection against pleuro-pneumonia may now be obtained. The dose is $\frac{1}{2}$ c.c. and the price for same is ONE SHILLING for 50 doses or portion thereof.

Application must be made to the Under Secretary for Agriculture or to the Principal Veterinary Surgeon, Stock Experiment Station, Yeerongpilly.

Poultry.

FINAL REPORT ON SIXTH EGG-LAYING COMPETITION, Q.A. COLLEGE, 1909-10.

The sixth egg-laying competition at the Queensland Agricultural College closed on 31st March. There were 17 competing pens and 3 from the College, the latter being non-competitive, making up the total number of pens to 20, or 120 birds. The breeds represented included—White Leghorns (11 pens), S.L. Wyandottes (4), G.L. Wyandottes (1), Black Orpingtons (2), Plymouth Rocks (1), and Rosecomb Minorcas (1). The total number of eggs laid for the twelve months was 24,670, giving an average of 1,233·5 per pen, or 205·6 per bird, thus creating a new "world's record" for average. The winning pen, also, came within six eggs of our previous world's record for highest individual score. The cost of feed amounted to £38 2s. 8d., whilst the eggs sold realised £96 19s. 4d., thus giving a net profit, exclusive of labour, of £58 16s. 8d., or 9s. 9½d. for every bird in the competition. The average price realised for eggs was 11½d. per dozen; the price of feed was abnormally high during the first eight months of the competition. The cost of food per bird was 6s. 4d., slightly more than last year; this may be taken as the maximum for ordinary seasons. The method of feeding has been practically the same as it was last year. For the morning meal, bran and pollard, about equal parts, with ¾ lb. of desiccated meat or a little Sunlight oilcake on alternate mornings. This was mixed into a crumbly mass (not sticky), and a good tablespoonful of this mixture was fed at 6·30 each morning to each bird. At midday, green chaffed lucerne, a good handful for each pen, was fed, also, when procurable, a similar amount of soup meat. The evening meal was given at 4·30, and consisted for the most part of good sound wheat, as much as they would eat up clean, with now and then maize or good feed oats by way of variety, the former in winter and the latter in summer. The average quantity of grain consumed daily would be about 1 pint for six birds, or a little more when they were laying heavily. Sea-shell grit and fresh cool water were constantly kept in the pens. The feeding is of very great importance if a maximum production of eggs is required, as, when birds are penned up as are those taking part in competitions, every element for egg-making must be supplied in the feed. Meat is of great importance in egg production, and must be supplied if the best results are to be obtained; fresh meat is the most relished by the fowls, but, if this is not procurable, desiccated meat is a good substitute. Plenty of green food—such as lucerne, rape, cabbage, &c.—is also essential; milk thistles are good if nothing else is available. A constant supply in the pens of good clean cool water, grit, and sea-shell, with a good variety of food will complete the list and give splendid results. The quantity to be fed must be decided by the feeder, according to the birds' appetites and the number of eggs they are laying.

A sharp lookout was kept for any birds that did not come up for their food, or that appeared to be moping, with the result that only four birds died during the twelve months; these were promptly replaced.

The weather conditions have been better for egg production than was the case in the previous year. The great heat wave experienced during the previous summer, was avoided, and owing to the splendid rains and the moderately cool weather during the last three months, the season has been in favour of egg production as compared with the corresponding period last year.

Remarks on various pens:—Mr. Padman's winning pen contained birds of medium size, very active, and strong constitutioned. With one exception, they ran right through the twelve months without a moult. A splendid pen. Mr. Aitken's pen (second prize) was composed of birds of good size, some of them fit for show. They have put up the best record we have had here for birds of similar size. One moulted during the competition. Also a fine pen. The birds in Mr. Holmes's pen (third prize) are of a fair size, and good layers. Had it not been for two of them moulting, their record would have been far larger. A really good pen. Mrs. McKay's pen was unfortunate in moulting twice. This is a far better pen than her last year's winners, having beaten her previous record in spite of the double moult. Mr. Green's S.L. Wyandottes form a splendid pen, and have put up the best performance for the breed that we have yet had at the College. The representatives of Alex. Smith, D. Johnston, E. A. Smith, R. Burns, and Geo. Robertson have all put up splendid scores, considering the fact that some were sent when too young, whilst others had to undergo a double moult. Some of the remaining pens have also been most unfortunate, especially Mrs. Craig's No. 1, which moulted twice, and also suffered from a slight attack of warts.

The following are the records for each month and for the whole period:—

DETAILS OF EGGS LAID DURING THE TWELVE MONTHS.

—	Breed.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Grand Total.
A. H. Padman, Adelaide, S.A. ...	W. Leghorns ...	96	111	115	133	129	149	149	144	145	126	118	117	1,532
P. Aitken, Boonah	Ditto	70	100	118	134	138	148	149	133	122	127	108	112	1,459
J. Holmes, Toowoomba	Ditto	36	113	90	135	147	154	147	139	137	132	82	88	1,400
Mrs. McKay, College road, Gatton ...	Ditto	100	52	83	119	136	149	161	140	145	122	74	98	1,379
J. Green, Warwick	S. L. Wyandotte ...	114	104	123	134	138	123	106	114	114	114	90	101	1,375
Alex. Smith, Goodna	W. Leghorns ...	125	104	28	89	150	142	148	135	115	126	89	79	1,330
D. Johnston, Logan road, Brisbane ...	G. L. Wyandottes ...	5	31	74	133	146	148	135	128	149	127	107	118	1,301
E. A. Smith, Paddington, Brisbane ...	W. Leghorns ...	48	50	16	78	134	155	172	153	154	150	91	90	1,291
R. Burns, Freestone road, Warwick ...	S. L. Wyandottes ...	31	83	52	102	147	153	141	114	118	114	95	126	1,276
Geo. Roberson, Gatton	Ditto	54	86	34	134	127	128	134	116	114	104	92	96	1,219
Cowan Bros., Burwood, N.S.W. ...	Black Orpingtons ...	10	26	97	131	106	139	136	112	116	112	86	91	1,165
Mrs. Craig, Miriam Vale	W. Leghorns (No. 1)	64	2	6	65	123	147	152	143	146	143	109	54	1,154
Ditto ditto	Ditto (No. 2)	44	23	30	120	117	137	149	114	121	109	97	73	1,134
P. Aitken, Boonah	S. L. Wyandottes ...	51	49	51	100	108	105	119	107	112	94	91	104	1,091
J. Gosley, Childers	W. Leghorns ...	26	9	6	100	129	136	155	153	133	114	71	56	1,088
J. Zahl, Boonah	Ditto	3	0	8	68	114	136	134	119	120	127	98	66	993
Mrs. Cross, Redbank	R. C. Minorcas ...	15	12	22	36	93	127	136	117	105	107	95	74	939
	NON-COMPETITIVE PENS.													
Queensland Agricultural College ...	W. Leghorns ...	43	75	22	115	143	150	155	143	155	132	105	70	1,308
Ditto ditto ...	Plymouth Rocks ...	21	14	15	91	142	142	113	117	133	113	101	104	1,136
Ditto ditto ...	Black Orpingtons ...	7	6	32	114	134	132	139	123	124	116	96	77	1,100
	Monthly totals ...	963	1,050	1,022	2,134	2,601	2,800	2,860	2,564	2,578	2,409	1,895	1,794	Grand total, 24,670

STATEMENT OF RECEIPTS AND EXPENDITURE.

Receipts.

	£	s.	d.
Entry fees, 18 at 10s. (1 entry cancelled)	9	0	0
Sale of eggs, Orient S.S. Company, 1,472 3/12 dozen at 1s.	73	12	0
College dining hall, 583 7/12 dozen	25	8	1
TOTAL	£108	0	3

Expenditure.

	£ s. d.	£ s. d.
Food, wheat, 20 bags	20 11 4	
,, pollard, 15 bags	7 14 6	
,, bran, 10 bags	4 18 3	
,, oats, 3 bags	2 0 0	
,, maize, 1 bag	0 14 0	
,, desiccated meat, 200 lb.	0 18 4	
,, sunlight oilcake, 1 cwt.	0 8 3	
,, green lucerne	10 0 0	
,, soup meat	8 0 0	
		38 2 8
Prize money	...	13 13 0
Breakages, eggs sent to Orient S.S. Company	...	2 1 0
Net profit on whole of competition	...	54 3 7
TOTAL	...	£108 0 3

H. C. QUODLING, Acting Principal.

The Orchard.

THE EFFECT OF GRASS ON TREES.

The effect of grass on trees is probably intimately connected with that fundamental question in agriculture to which no comprehensive answer has yet been obtained—namely, the fertility of the soil. The casual observer may dismiss the subject by stating that it is simply due to the grass robbing the tree of its nourishment or its moisture, but such a statement can only be based on ignorance of the facts, and of all the work which has been done in the matter. The subject has been under investigation at the Woburn Experimental Fruit Farm for the last fifteen years; one report (the third) dealing with it was published in 1903, and it is hoped that another will be issued before very long.

Although no final solution of the problem has yet been obtained, considerable progress has been made in the matter, and various possible explanations have been definitely negatived. Foremost amongst these is the theory that the action is due to the grass absorbing all the food and water from the soil. The original experiments are, perhaps, the most striking, though not the most precise, on this point. A large number of apple-trees were planted in rows, 11 ft. apart, in 1904; the ground in one row was kept tilled, and that in the other row laid down to grass; the grass, when cut, is left to rot on the ground, and the same amount of manure is given to both rows of trees. Those in the tilled soil are now such large trees that half of them have had to be removed, their spread being some 15 to 16 ft.; those in grass did not grow at all for several years, and only began to make growth when their roots extended beyond the grassed area; they are still miserable specimens of trees, about one-sixth the size of the others, and the crops borne by them have only been about one-tenth of that of their neighbours. Yet the grassed soil is actually richer than the tilled soil. In the fifteen years it has had removed from it only one crop of grass (that actually growing at any given moment) and the small amount of material required for the stunted growth of the trees; whereas from the tilled soil there has been removed material for an annual crop of fruit, and also for the vigorous growth of the trees. Analysis also shows that the grassed soil is the richer of the two, and it also shows that, in this particular case, there is practically no difference between the water contents of the grassed and open plots.

Of the many other experiments on these points, the most conclusive are, perhaps, those made with apple-trees grown in pots. In some of these the grass roots were separated from the tree roots by very fine wire gauze, through which the former could not penetate; the pots were weighed and watered every two days, so as to keep the water contents the same, and such water and food as was added, was introduced from below, so that the tree should have the first pull at it. Yet the trees still suffered badly from the grass, although the soil was actually moister and richer than in the case of similar trees without grass. Corresponding experiments have been made with trees planted in the open. Though increase of moisture up to a certain point, and increase of food in certain cases, may benefit the trees, the benefit is much too small to do more than very slightly diminish the deleterious effect of the grass.

The behaviour of a tree in grass is clearly a case of starvation in a land of plenty, and this cannot be explained by supposing (untenable as such a supposition is for other reasons) that the grass roots suck up whatever nourishing solution there is in the soil, leaving none for the tree roots. The pot experiments, just quoted, effectively negative this. Nor can we explain the matter by supposing that the tree was only temporarily affected by the grass, but being in a weak state after transplanting this check resulted in its becoming permanently stunted; for a precisely similar, and even more marked

effect has been proved to be produced by grassing over trees which have been established, in one case for four years, and in another case for twelve years; the effect, indeed, was so grat that, in the first instance, many of the trees have been killed, and, in the second instance, a similar result appears imminent.

Other explanations which suggested themselves have been investigated, and found equally unacceptable; these were differences in soil temperature, differences in aeration or proportion or carbon dioxide, and difference in the physical condition of the soil. The only other explanation which appears to be possible is that the growth of the grass results in the formation of some substance which is poisonous to the tree. This may be an active poison—a toxin—or the poisonous action may result from an alteration in the proportion of various substances present in the soil. An active poison may be produced in various ways, such as by the decomposition of the débris of the grass, actual excretion from the grass roots, or as a product of the bacteria present in the soil. As to the origin of the toxin no definite evidence has yet been obtained, but it has been found that toxins may be formed in soils by heat, and other means, producing effects which are analogous in many respects with those produced by grass on trees. Thus, on heating soil, substances are produced which are toxic towards the germination of seeds, and these have been found to be toxic towards plant growth also. That established plants grow better in heated than in unheated soil, is due to the fact that heating causes a considerable increase in the soluble nitrogen present in the soil, and also in the composition of the bacterial flora of the soil. Moreover, the toxin formed as the result of heating the soil soon becomes oxidised and destroyed, allowing the favourable conditions to assert themselves. If, however, the toxin is present in sufficient quantity, it is not all destroyed before the plant grows, and its deleterious effect becomes apparent. It is noticeable that this effect varies greatly in different cases, and is very much less in the case of grasses than in that of the other plants which have been examined. Earth from grassed ground behaves in the same way as earth which has been slightly heated and which contains only a limited amount of toxic matter, for trees planted in it (the grass being removed) do better than in soil taken from tilled ground, such toxic matter as there was present in it having evidently become destroyed before the tree started into growth; whether its presence originally in soil can be established by its effect on germinating seeds, still remains to be seen.

If the formation of a toxic substance is the explanation of the grass effect, we might naturally expect great variations in this effect in different soils; and this is certainly the case. At Ridgmont the effect is, perhaps, greater than in any other instance which has come under the writer's observation, but cases of very nearly the same intensity have been found in various parts of the kingdom, whilst only one instance has been noticed where the grass, apparently, had no effect. This variation in intensity with the nature of the soil is, probably, the chief reason why the action is not more widely recognised; but two other causes contribute to an under-estimation of the grass effect, the one that it is very rare for a plantation to be partly grassed in such a way as to give satisfactory evidence as to the bad effect of this grassing; the other, that the grassing is generally effected gradually, extending throughout several seasons, and in that case, it has been found, the effects are far less marked than they otherwise are, the trees, apppparently, becoming gradually adapted to the altered conditions.

No definite connection has yet been found between the nature of the soil and the intensity of the action, but it does not appear to be governed by the richness of the soil. The case, alluded to above, in which the action has been nil, cannot be explained by any greater depth of soil into which the tree roots penetrate, thus getting away from the grass roots, for many of the trees have been lifted, and all have been found to have their roots near the surface.—SPENCER PICKERING, "Gardener's Chronicle," 18th December, 1909.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order PORTULACEÆ.

PORTULACA, Linn.

P. oleracea, *Linn.* (Pigweed) **var. sativa,** *DC.* Branches erect; at one time cultivated and used as an ingredient in salads. During the present year it has become a weed in some Brisbane gardens.

Order MENISPERMACEÆ.

TRIBE CISSAMPELIDEÆ.

STEPHANIA, Lour.

S. Bancroftii, *Bail.* (After Dr. Thos. L. Bancroft). A tall glaucous climber arising from an almost globose rootstock, often measuring near a foot in diameter. Young stems smooth, terete. Leaves peltate, attached to the petiole about 1 in. from the margin, orbicular or broadly-ovate, 2 to 5 in. diam., margins entire; nerves radiating from top of petiole, about 12, the three upper ones forked and stouter than the others, all much branched in the upper part, and mixing with the close fine reticulate veins; petiole about 3 in. long, smooth-terete. Peduncles axillary, solitary, 5 to 9 lines long, bearing a dense globular subhemispherical head of flowers, the male about 6 lines diam., the female heads with fewer flowers. "Bracts, 6 or more, one larger than the rest, ovate-lanceolate, $\frac{3}{4}$ line long. Flowers opening irregularly. Pedicels $\frac{1}{2}$ line long, fleshy, narrowed at the base. Calyx 2 lines diam.; sepals 6, in 2 series, free, ovate-obtuse, concave, $\frac{3}{4}$ line long, glandular. Corolla cup-shaped; petals 3, broadly-ovate, $\frac{1}{2}$ line long. Filaments 6, in a short stout column. Anthers 6, dehiscing together in a horizontal line."—*H. Tryon.* Fruit pyriform, flattish, 3 lines long, with a thick corrugated margin.

Hab.: Stannary Hills, *Dr. Thos. L. Bancroft,* who found the plant to be equally poisonous with the other Queensland species.

Order SAXIFRAGEÆ.

TRIBE ESCALLONIEÆ.

ABROPHYLLUM, Hook. f.

A. ornans, *Hook. f.,* **var. microcarpum,** *Bail.* A tall shrub, the branches and leaf-ribs more or less clothed with appressed hairs, like the normal form. The leaves are also narrower, but scarcely differ from the above. The inflorescence, however, differs considerably, being quite slender, and the fruit very much smaller.

Hab.: Dunk Island, *E. J. Banfield.*

Order COMPOSITÆ.

TRIBE ANTHEMIDEÆ.

COTULA, Linn.

SECTION COTULA.

C. coronopifolia, *Linn.,* Benth. Fl. Austr. iii., 549. Plant glabrous and diffuse, the stems rooting at the base, and ascending from $\frac{1}{2}$ to nearly 1 ft. Leaves lanceolate oblong or almost linear, coarsely pinnatifid or almost

entire, 1 to 2 in. long, dilated at the base into a short sheath round the stem. Flower heads 3 to 5 lines diam., on peduncles longer than the leaves. Involucral bracts oblong-linear. Receptacle flat or slightly convex. Female florets in a single row, on flattened pedicels, half as long as the involucre, the ovary bordered by a transparent wing notched at both ends, the style very short in the terminal notch, without any corolla; disk-florets exceedingly numerous, on much shorter persistent pedicels, the corolla tubular, more or less dilated above the ovary, 4-toothed. Achenes of the female florets nearly ¾ line long, including the thickish spongy wing surrounding them, those of the disk smaller, with a narrow wing.—Benth. l.c.

Hab.: Collected in Southern Queensland by *Mr. Josh. Wedd.*

Order PIPERACEÆ.

PEPEROMIA, Ruiz and Parr.

P. affinis, *Domin sp. nov.* Plant like but more robust than *P. reflexa,* colour a deep-green, or somewhat glaucous. Leaves in whorls of 4, shortly petiolate, flat, ovate, lanceolate, 6 lines long, 5 lines broad, coriaceous, scarcely fleshy, almost membranous when dry, 3-nerved. Spikes terminal, solitary. Bracts small peltate. This new species principally differs in the form of its leaves and nerves from *P. reflexa.*

Hab.: Atherton, *J. F. Bailey*; Tambourine Mountain, *Dr. Karl Domin.*

Order FUNGI.

TRIBE UREDINACEÆ.

PUCCINIA, Pers.

P. Sclerolæna, *Mass.* "Ql. Agri. Journ.," xxiii., 218, without description. Sori more or less densely aggregated, for the most part hypophyllous, beset with yellowish spots, covered for a long time with a leathery and somewhat thickened epidermis; slightly projecting, of a dark sooty colour; varying in size. Teleutospores oblong or between ovate and subclavate, moderately constricted in the middle, at the apex usually more or less apiculate, of a pale cinnamon colour, $40 \times 30\ \mu$; with somewhat thickened pedicel $120 \times 4\ \mu$. In the same teleutospore-bearing sori uredospores are present. These are globose, very minute, somewhat echinate, of a pale tawny colour, $15 - 18\ \mu$ in diameter. Ex. Kew (Eng.) Bull. No. 1, 1910.

Hab.: On *Sclerolæna biflora,* R. Br., Roma, *C. T. White.* Mr. Massee says that the species is "not closely allied to any known species. The teleutospore sori are variable in size and form, and are somewhat persistent, being protected by the coriaceous epidermis of the host."

UNCINULA, Lév.

TRIBE PERISPORACEÆ.

Mycelium, floccose; perithecia, globose; appendages rigid, simple, bifid, or dichotomous, uncinate, at length bent upwards.—Benth. Ontl.

U. australiana, *D. McAlpine,* Journ. Linn. Soc., N.S.W., xxiv., 302. E. S. Salmon, monograph of Erysiphaceæ, 118. Amphigenous; mycelium persistent or subpersistent; perithecia usually gregarious in patches on the mycelium, sometimes more or less scattered, $90 - 140\ \mu$ in diam., usually about 12, about equalling the diameter of the perithecium, rarely 1½ times the diameter, 1 septate and coloured pale or dark-brown at the base (sometimes one here and there aseptate and colourless), simple, smooth, thin-walled, narrowed upwards when young, not enlarged upwards when mature, about 5 μ wide in the upper half, apex usually helicoid; asci 3 – 5, broadly ovate to subglobose, with or without a short stalk, 42 – 50 by 30 – 40 μ; spores 5 – 7, rarely 8, 20 – 22 by 10 – 12 μ.

Hab.: On *Lagerstrœmia indica* in the Brisbane Botanic Gardens, Feb., 1910; also on plants of this genus in the Southern States.

Order ALGÆ.

The following additions to the Queensland Seaweeds have been determined for me by A. D. Cotton, of Kew, England.

FAMILY CAULERPACEÆ.

Caulerpa cupressoides, var. Lycopodium, *Weber.*
Hab.: Cape Gloucester, *F. Kilner*; Dunk Island, *E. J. Banfield.*

C. racemosa, var. læte-virens, *Weber.*
Hab.: Cardwell, *H. Newport.*

FAMILY UDOTEACEÆ.

Udotea argentea, *Zanard.*
Hab.: Dunk Island, *E. J. Banfield.*

U. orientalis, *Giff.*
Hab.: Dunk Island, *E. J. Banfield.*

Halimeda cuneata, *Hering.*
Hab.: Dunk Island, *E. J. Banfield.*

FAMILY CHÆTANGIACEÆ.

Galaxaura obtusata (Soland.), *Lamour.*
Hab.: Moreton Bay, *Mrs. Chas. Coxen.*

G. fragilis (Lamk.), *Kuetz.*
Hab.: Dunk Island, *E. J. Banfield.*

FAMILY SPHÆROCOCCACEÆ.

Ceratodictyon spongiosum, *Zanard.*
Hab.: Dunk Island, *E. J. Banfield.*

Hypnea musciformis (Wulf.), *Lamour.*
Hab.: Moreton Bay, *J. H. Simmonds*; Dunk Island, *E. J. Banfield.*

FAMILY RHODYMENIACEÆ.

Plocamium coccineum, *Lyngb.*
Hab.: Caloundra, *R. A. Bulcock.*

P. Priessiamum, *Sonder.*
Hab.: Caloundra, *R. A. Bulcock.*

Laurencia Forsteri (Mert.), *Grev.*
Hab.: Moreton Bay, *C. T. White.*

Acanthophora dendroides, *Harv.*
Hab.: Moreton Bay, *C. T. White.*

A. Thierii, *Lamour.*
Hab.: Dunk Island, *E. J. Banfield.*

L. obtusa (Hud.), *Lamour.*
Hab.: Port Denison, *F. Kilner*; Dunk Island, *E. J. Banfield.*

Horticulture

OKRA.

This vegetable is also known as "Okra Gumbo." It is much grown in the older tropical countries, but is scarcely ever seen in Queensland unless as a curiosity. The long handsome pods, before they are ripe, are a capital additions to curries, and soups, and plain boiled they are hardly distinguishable from asparagus. The green pods may also be preserved in brine like cucumbers. If allowed to ripen, they become hard and fibrous, and are then of no value for culinary purposes, hence they must be gathered when young and tender. The principal value of the tree is for the oil contained in the ripe seeds, constituting the "oil of Ben" of commerce. This oil is inodorous, nearly colourless, and possesses the remarkable properties of keeping for years without becoming rancid, and of not congealing under the influence of cold. In the West Indies these qualities lead to its being preferred to olive oil for salads. The tree is easily raised from the seed, and is of rapid growth. It thrives in all garden soils. The accompanying illustration of an Okra plant is from a photograph of young trees in full bearing in the garden of Mr. H. W. Mobsby, artist to the Agricultural Department, at Indooroopilly.

WHAT TO DO WITH LEGGY PLANTS.

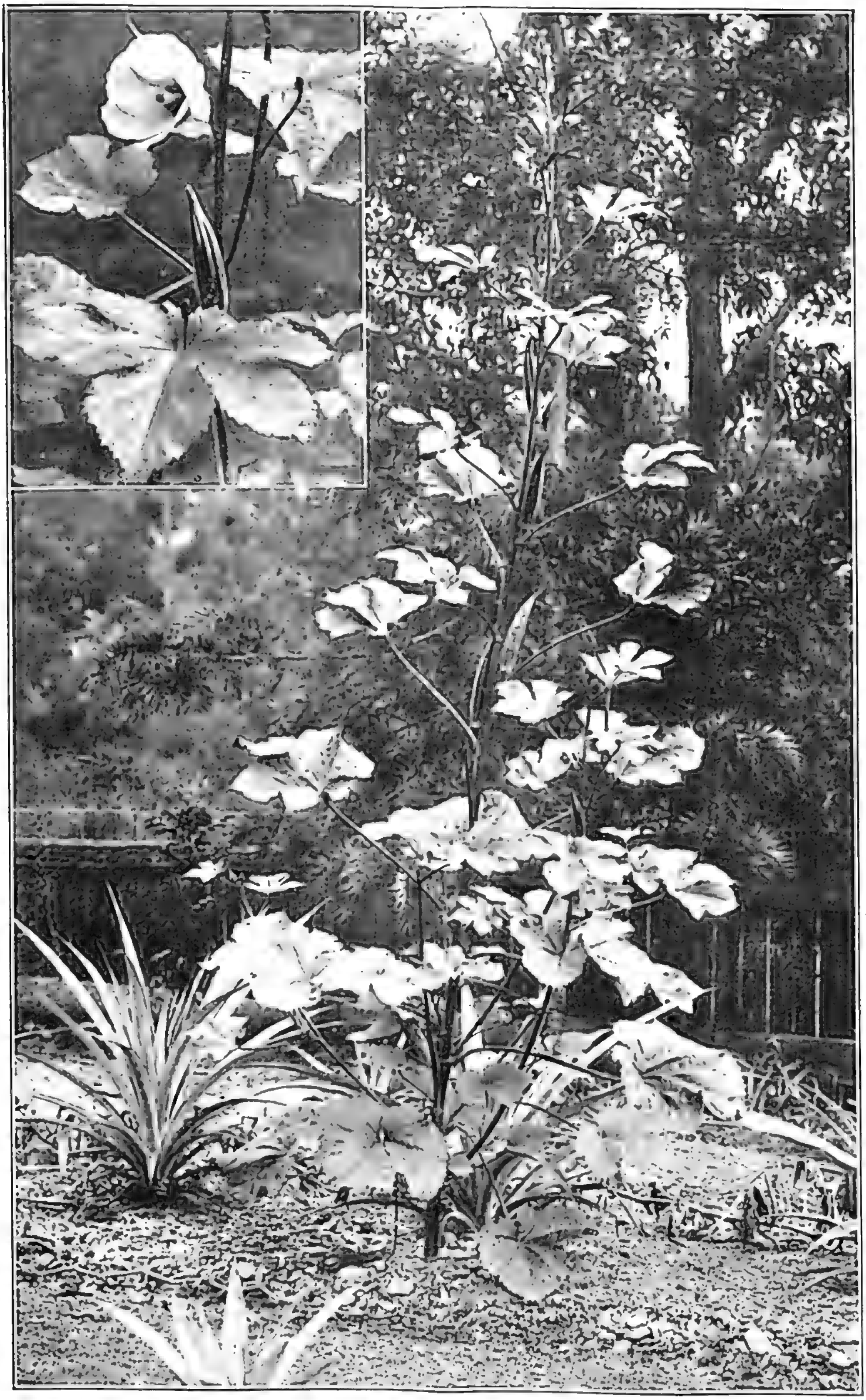
Often in the greenhouses of amateurs one finds plants of Dracaena and other families of the plant world which have, in the course of time, made long stems which are devoid of leaves, and the question frequently arises, What can we do with such specimens? In some cases these leggy plants, as they are usually termed, are of service, as, for example, when tall specimens are needed for the centre of a stage or group; but, generally speaking, those plants whose bottom leaves are close to the pot are the most serviceable.

Fortunately, the amateur with a greenhouse can make his or her leggy plants into compact specimens without much difficulty, and the accompanying illustrations of a Dracaena will, it is hoped, make the method of doing so plain to every beginner and amateur.

In Fig. 1 a Dracaena with a long, bare stem is shown. It will be noticed that the plant has a splendid head of leaves, and our object is to get the lower ones so that they nearly touch the pot. It should also be observed that there is a young plant growing up from the base of the old one, which will be referred to later. Turning to Fig. 2, we find there the same plant shown on a larger scale, and in its stem a cut, made in an upward direction just below the lowest leaves, is plainly shown. It should be carefully noted that this cut is made about halfway through the stem in a sharply sloping direction and then carried upward for about 1½ in. To keep the cut open and thus form a tongue, a piece of a wooden match was inserted at the top of the wound and trimmed off level with the stem on each side. This cut is made with the object of inducing the plant to form roots from the tongue just in the same way that a carnation layer is induced to make roots.

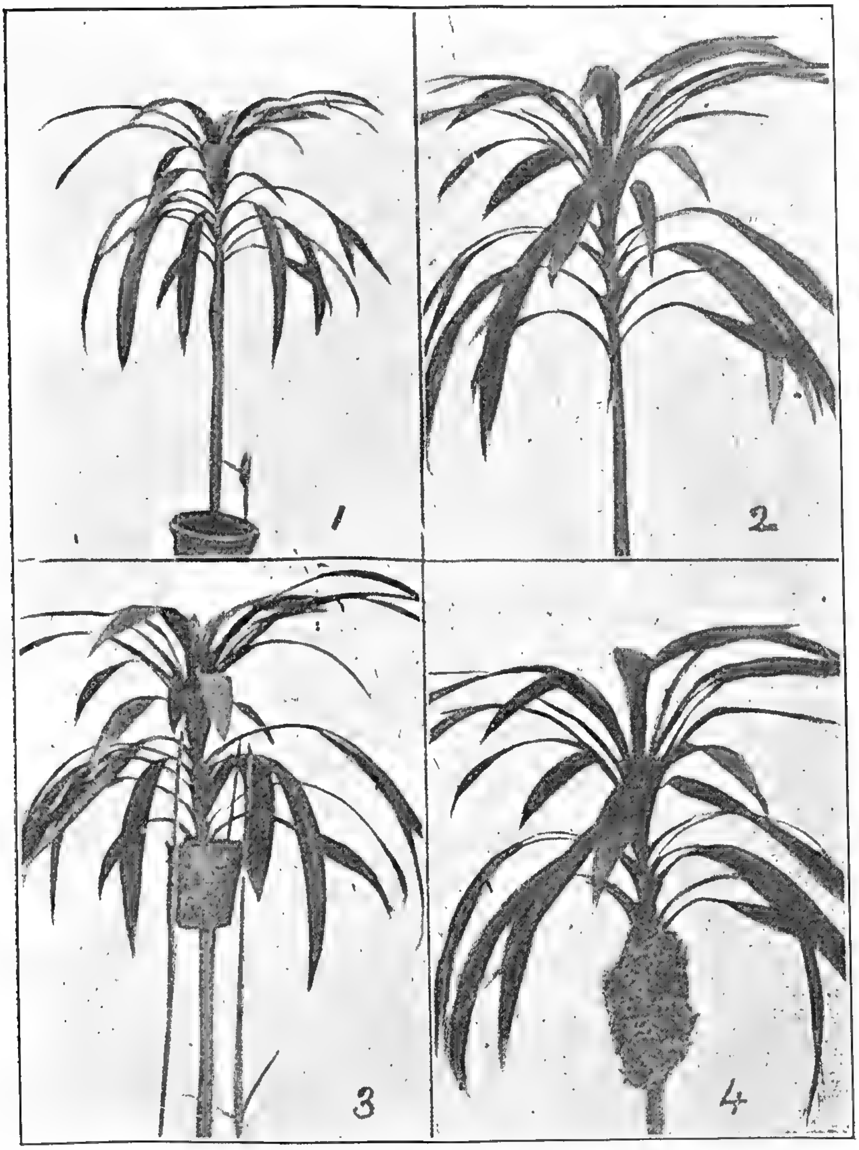
Fig. 3 takes us another stage forward with the work. Here it will be seen a 2½-in. pot has been split lengthwise into half, and then bound tightly round the stem and held in position by three bamboo canes, which are thrust

Plate XIV.



Okra Plant in Bearing.
The Flower is shown in inset above.

Plate XV.



TREATMENT OF LEGGY DRACAENAS.

1. A Dracaena plant which has become leggy ; that is, the bare stem is too long.

2. The same plant with a cut made in the stem to form a tongue. A ring of bark may be taken away instead, if preferred.

3. A small pot split in halves and then tied round the wound. This is filled with suitable soil.

4. Sphagnum moss bound firmly round the wound. If kept moist roots will soon permeate this moss.

firmly into the soil of the pot shown in Fig. 1. It should be noticed that the stout string is bound outside the stakes, and treated thus the pot is made quite firm. After being fixed in position some pieces of broken pot are placed in the bottom of the pot, which is then filled to within half an inch of its rim with soil composed of rather rough fibrous loam two parts, coarse peat one part, and coarse sand one part, about six pieces of charcoal about the size of Barcelona nuts being added at intervals as the work of filling proceeds. The soil should be tucked in firmly, but not made hard. Subsequently it must be kept moist, but not maintained in a sodden state, and the plant should be kept in the warmest part of the greenhouse. In the course of a month or two roots will be formed, and when it is seen that these are pushing their way through the bottom of the small pot the stem may be cut through with a sharp knife or small saw immediately beneath the pot, and the plant transferred to one of larger size.

Before proceeding further we will turn our attention to Fig. 4. Here we find the wound has been covered with a good-sized mass of sweet sphagnum moss, this being tied firmly in position. If this is maintained in a moist condition and the plant kept in a warm temperature, roots will form in the moss, and when their white tips can be seen outside the ball, the stem may be cut through as advised above, and the plant potted into a small but well-drained pot, using the same soil mixture as advised for filling the small pot. After this repotting the plant, whether rooted in moss or a pot, must be kept in a rather close and moist atmosphere for about a fortnight, and very carefully watered in the meantime, after which it may be gradually given more air and will quickly become an established specimen with leaves close to the soil.

Some gardeners, instead of making a cut in the stem as shown in the illustration, remove a ring of bark, about 1 in. or rather more in length, from the stem just below the leaves and fix a pot or moss around it precisely as indicated; but, generally speaking, roots are longer in forming than they are from a cut, and the method illustrated is the best for the beginner to adopt. After the top has been removed we must see what can be done with the old stem. We have already noticed that a young plant is growing from the base, and if the old plant is carefully turned out of its pot this offset may be easily cut off with a few roots and potted into a small, well-drained pot, using soil as already advised. In all probability we shall also find some roots on the old plants which have become very much thickened and which are termed by gardeners "toes." These, too, may be removed, and if laid in some cocoanut fibre refuse in a warm spot in the greenhouse and kept moist they will soon form shoots and new roots, and may then be carefully potted up as young plants.

This still leaves us with the old plant, which may be treated in two ways—viz., returned to its pot and placed in a warm greenhouse, where it will, during the course of the summer, most likely produce a number of side shoots (especially if kept rather dry at the roots and the stems syringed daily), which may be taken off when large enough, made into cuttings and rooted, or the stem may be cut into pieces 2 in. long, and these laid in cocoanut fibre refuse in a close propagating-case where they can be kept moist. Under such conditions some of them will produce shoots and roots, when they can be transferred to small pots. If preferred, these pieces of stem may be split lengthwise, and the cut surface laid on the fibre, some gardeners thinking that this induces roots and shoots to form more quickly. The beginner who wishes to investigate the matter might try some treated one way and some the other. It will be seen that from one old plant quite a number of new ones can be secured without very much trouble.

In addition to the Dracaena, several other plants—viz., Crotons, India-rubber plant (*Ficus elastica*) and *Araucaria excelsa*, may have their tops

rooted in the same way, but a warm, moist atmosphere is essential. The old stems of all these will, after the top has been removed, produce side shoots, which may be used as cuttings, and the Indiarubber plant may be cut up as advised for the Dracaena if desired, taking care, however, to secure one joint or leaf-scar to each piece.—"Garden."

MENDELIAN PRINCIPLES OF HEREDITY IN PLANT BREEDING.

Some time ago (October, 1907) we published a very interesting address on "Mendel's Law of Plant Breeding," which is equally interesting and valuable. tion, by Philip L. Weaver. We now have an article in one of our exchanges, on "Mendel's Law of Plan Breeding," which is equally interesting and valuable. The article first treats of

DOMINANCE AND RECESSIVENESS.

The simplest of the principles discovered by Mendel is that which is usually referred to as the "law of dominance." This principle should hardly be called a law, because it is in no wise general and in very few cases is dominance absolute. The phenomena of dominance and recessiveness may be illustrated by a few examples.

If a red-flowered variety of the common garden pea be crossed with a white-flowered variety, the progeny will have red flowers. According to Mendel's original conception a cross of this kind brings together two antagonistic characters. The progeny inherit the red flower colour from one parent and the white colour from the other. It, therefore, has both these characters. It happens, however, that the red character predominates over the white and comes to expression, while the white character is not visible in the cross-bred individual. Mendel suggested that a character behaving as the red character does in this cross should be called a "dominant character," while one behaving as the white character in this cross should be called a "recessive character."

If we cross a bearded variety of wheat with a smooth variety, that is, one that has no beards, the hybrids thus produced either have no beards or the beards will be only slightly developed. Hence, we say that smoothness is dominant to beards, at least partially, or, which means the same thing, that beards are recessive to smoothness. The cross between polled and horned breeds of cattle has no horns, though a small proportion of such crossbred animals may have "scurs," that is, imperfect horns. Hence, we say horns are recessive and the poll character dominant. Many other cases might be cited to illustrate dominance and recessiveness of hereditary characters, but the above examples will serve to illustrate the principles sufficiently here.

While it is not uncommon for a character to be dominant or recessive in a cross, it is seldom that dominance is absolute. The presence of the recessive character can usually be detected, and in some cases very easily. Thus, in the cross between bearded and smooth wheat the hybrids usually show a slight tendency to be bearded. Likewise, as already stated, the cross between horned and polled cattle may have scurs. It frequently happens that instead of either of two opposite characters being dominant we get an intermediate form between the two parent forms. Thus, in the cross between ordinary long-headed wheat and the short-headed club wheats the hybrid has heads of intermediate length, though they are more like club wheat than they are like the ordinary kinds, so that the club character is at least partially dominant. In certain crosses between red-flowered and white-flowered ornamental plants the hybrids are pink.

SEGREGATION.

We have seen that when two naturally opposite characters meet in the same individual one of them may be completely dominant, as the poll character in many individuals of the cross between polled and horned cattle, or the crossbred individual may exhibit a character intermediate between the opposed characters of its parents, as the pink colour of certain hybrids between red-flowered and white-flowered plant varieties, or the hybrid may exhibit a character different from the corresponding characters of either of its parents, as the purple colour of hybrid primroses produced by crossing certain red and white varieties.

In a pure race of plants having red flowers we may assume that each individual which bears seed transmits to all its seed the tendency to produce red flowers. Likewise, in a pure white-flowered race, each individual transmits to its progeny the tendency to produce white flowers. But what of the hybrid between two such races? What does this hybrid transmit to its offspring? Let us consider the case of the hybrid primrose having purple flowers. The facts are, as found by experiment, that this purple hybrid produces three kinds of progeny. About one-fourth of the seed produced by the hybrid produces plants having red flowers like those of the red-flowered parent of the hybrid. Another fourth have white flowers, while the remaining half have purple flowers. Furthermore, the red and the white flowered plants of this second generation will reproduce only red or white progeny, as the case may be; that is, they behave exactly like pure red or pure white races. On the other hand, every one of the purple-flowered plants will produce in the next generation three kinds of progeny as before. One-fourth of the progeny of these purple-flowered plants will have red flowers, one-fourth of them white flowers, and half of them purple flowers. This experiment was continued by an English florist for fifteen years, always with the same result. The purple always split up into one-fourth red, one-fourth white, and one-half purple, while the reds and the whites thus produced always behaved like pure races of red or white. From these facts we infer that in self-fertilised species an individual which is hybrid with reference to a particular pair of characters tends to produce progeny one-fourth of which is of pure race like one of the parents of the hybrid, another fourth of pure race like the other parent, while the remaining half is hybrid like the original hybrid itself.

THE QUEENSLAND ORANGE CROP.

The Queensland correspondent of "The Fruit World," Mr. W. J. Smith, writes from Mapleton to that journal:—

"The crop of mandarins promises to be a record one for Mapleton, and I think from what I have heard, Queensland in general. Our strawberry growers are busy planting, and I think the area under crop will be about the same this year as last.

"Does orange-growing pay? Well, as an answer, let me quote that two parties have lately bought land here for orange-growing at £30 per acre unimproved, which means that by the time it is under crop it will cost at least £60 per acre. Another orchardist here was offered £950 for 4 acres of orange trees, and 6 acres of paddock, or 10 acres in all. Yet a few years ago, before oranges were grown here, the best of the land could be had for 10s. per acre. And from what I can see, there are another half-dozen orchards being laid out, as clearing operations have begun on that many different pieces of land. Let them all come. It will be more work for some one."

Tropical Industries.

COFFEA ROBUSTA.

The following interesting notes on *Coffea robusta*, are taken from Bulletin No. 7 of the Department of Agriculture of the Federated Malay States, by W. J. Gallagher, M.A., Director of Agriculture, F.M.S. :—

Coffea robusta was discovered wild in the Congo region by Emil Laurent in 1898. The plant was taken up commercially by a Brussels horticultural firm and named *Coffea robusta* by them. A few plants were brought in Wardian cases to Java in 1900, where in 1905 it first began to be planted to some extent, and in considerable quantity in 1908 and 1909. Except in the Experiment Station at Kuala Lumpur, where it has been in bearing for some time, it was not planted in the F. M. S. until about a year ago when small areas were put down in the Klang and Jugra districts, and mainly as a catch-crop in rubber.

COFFEA ROBUSTA AND COFFEA LIBERICA.

Robusta differs in many ways from the well-known Liberica. The habit is somewhat different. Robusta grows more rapidly. An eight-months old Robusta plant is much larger and has more branches and leaves than a year old Liberica. The branches of Robusta are longer and have a tendency to bend down towards the ground so that the bush is rather umbrella-shaped. Gourmandisers and suckers are fewer than on Liberica; the leaves are a lighter green, thinner, and larger in size.

Robusta bears more berries in a cluster than Liberica, often over sixty; they are much smaller, but the beans are almost as large as the skin is thinner. On an overage 10 pikuls of Liberian berry give 1 pikul of market coffee. On the other hand only 4 pikuls of Robusta berry are required for a pikul of market coffee. Though many more berries go to a pikul than in Liberica the greater number in a bunch makes the picking if anything cheaper.

PRODUCTIVITY OF ROBUSTA.

Plants about eight months old begin to show flower buds, but a number of these early flowers may not develop into berries, and no concern need be felt if they do not, as, unlike Liberica, all later flowers set.

The plant blossoms the whole year through and no loss will occur from "windfall" if berries are collected once a month.

About ten months are required for the berries to come to maturity; when most of them in a cluster are straw-coloured they may be picked—as a rule the whole cluster may be gathered. A small crop can be collected in the second year, and in the fourth year practically the maximum crop is obtained. From that time onwards the yield is fairly uniform. The following figures give the production on an estate in Java planted 10 ft. by 10 ft., with forty-five nutmegs taking the place of coffee, that is 390 plants to the acre—

2nd year= 1 pikul (nearly) per acre.
3rd year= 6 pikuls per acre.
4th year=14 pikuls per acre.
5th year=14 pikuls per acre.

In Java it was at first urged against Robusta that its fecundity would not continue, but it is now seen that nine-year old plants are as vigorous and yielding as much (and more) as they did when they were four years old.

SOIL SUITED FOR ROBUSTA.

The root development of Robusta is comparatively rapid and intense. If a young Robusta plant is pulled up it will be found to have a mat of fine rootlets—considerably more than a Liberian plant of the same size would show. It is easily understood then that it thrives best in a loose clay soil, somewhat sandy for preference. Practically all our inland estates have soils which are admirably adapted to it.

In peaty land experience here has already shown that it does not thrive, at least where the peat is deep and badly drained. It behaves just as rubber and other plants do when they suffer from acidity in the soil; except that Robusta is more sensitive than the para tree. The acidity of such soils must be removed by good drainage and a liberal application of lime. The quantity of lime required will vary with the acidity, which must be tested from time to time. It is now proven that by such treatment pará can be made to thrive, and no doubt Robusta would too. *Coffea canephora*, which is equally prolific, would probably do better in such land.

NURSERY.

This should be made on virgin jungle soil and level land. It should not be made among rubber of more than a year old. The leaves of nursery plants grown in the shade of rubber-trees become white, and the growth is poor.

The beds should be about 4 ft. wide with a furrow of 2 ft. between. The seeds should be just covered with fine mould and may be put in 6 to 10 in. apart according to the length of time the young plants are to be kept before transplanting. The shade should be about 6 ft. high, and gradually removed until the plants are fully exposed when they have four pairs of leaves. This is a suitable stage for planting out.

A kati is about 2,000 seeds.

DISTANCE OF PLANTS APART.

If put down as a permanent cultivation of coffee only, the best distance is 12 ft. by 12 ft. with an additional plant in quincunx, which gives 600 to the acre.

As a catch-crop among rubber it should be in bands between the rows of trees planted for preference in the avenue style. The plants should be 6 or 7 ft. from the rubber rows and 5 ft. from each other. Thus in a field planted 28 ft. by 14 ft. or 30 ft. by 15 ft. four rows of coffee can be planted in the wider avenue; this will give about 1,150 plants in the former and 960 in the latter to the acre. Interplanted among cocoanuts which are 30 ft. by 30 ft., the coffee should be 7 ft. apart and 8 ft. from the cocoanuts, as it will be kept longer than among rubber. Three rows can be put in, and in such way along both lines that the cocoanut-tree stands in a square of coffee 8 ft. in side.

PLANTING OUT.

Seed at stake, young plants, or year-old stumps may be used. A stump, since it has a certain amount of reserve in it, will probably beat seed at stake put down at the same time and for this reason is to be preferred. Stumps are not available in the F. M. S. and the planter should put in young plants with four or five pairs of leaves, or, failing that, seed at stake, in which case it is probably safer to germinate the seeds first, but they should be put out as soon as the shoot shows, and great care taken to see that it is not broken.

The usual enemies of rubber-seed at stake will of course attack coffee put out in the field as seed. The seeds should be covered very slightly, and well shaded by palm leaves or ferns. If ferns are put in green they will curl up and become useless.

Seed at stake is undesirable in hilly land, as much of it is liable to be swept out of place or covered up so deep in detritus that it is unable to send its young shoots above ground. Putting out young plants is in every respect much safer and better. If the planter has to start with seeds he will lose nothing in growth or otherwise by starting them in a nursery. When transplanting the lateral roots may be trimmed or left alone, but the soil must be pressed fairly firmly round the root. When left loose it cannot retain moisture, and the young plants fail, if a drought comes on after planting out.

WEEDING.

Robusta must be kept absolutely clean-weeded. Hand weeding is best. Where the chungkol is used, the cooly is apt to wound the lower part of the stem which encourages the growth of unnecessary branches; these take away nourishment required elsewhere, and, if they appear, they should be cut off as soon as possible. A good digging or forking over the ground in the end of the second year would likely be beneficial. It should certainly be done in the third.

PRUNING.

The plant tends to form only primary branches. It should be topped at a height of 8 ft., to give a thicker branching by forcing out secondary branches which bear as well as the primaries. Less pruning is required than with Liberica, but it must be commenced earlier. Young shoots, due to injuries suffered during weeding, arise near the ground on plants of six months and older and must be cut off early. As a catch-crop most of the crop is to be collected in a few years, therefore the drastic pruning taking away half the foliage of the tree, which are now administered to interplanted Liberica every nine months or more, must be avoided. Pruning should be done with a sharp knife, and not by plucking.

PREPARATION FOR THE MARKET.

Except on a couple of estates all the coffee at present grown in the F. M. S. is sold in the berry to Chinese. The individual Chinese purchaser, or often two or three working together, prepares by hand machines all he buys. The European rubber planter who looks upon his Liberica as of little consequence finds it pays him better to sell the collected berries than to run his old coffee machinery for such small quantities as he can gather at irregular intervals. Where relatively large areas are under Robusta it will no doubt be found most profitable to put down sufficient plant to treat the berries on the estate. It is desirable from another point of view that the product should not be done in the rough way the Chinese follow. The present output of coffee here is probably all consumed locally. Besides planting Robusta as a catch-crop many planters are seriously, and perhaps wisely, considering the advisability of devoting part of their acreage to it alone. A considerably increased output of coffee may therefore be anticipated, and an export is likely to develop. If this is prepared by hundreds of small Chinese workers over the country, a first-class product cannot be expected, and the name of our coffee in the foreign market is sure to become synonymous with low-grade.

The berry is much smaller than that of Liberica, and the pulper used for the latter will be found to be unsuitable. A small Lidgerwood pulper is the best. Hr. van Lennep states in a recent number of the "Culturgids" that the beans must be fermented for thirty-six hours after pulping, and after being well washed, turned wet into the drying house to dry as quickly as possible at a high temperature. The guardiola dryer is especially suitable. While in the drying-house the coffee must be often moved so as to get a regular drying. Coffee so prepared and dried keeps its bluish colour long and has a good flavour.

ROBUSTA IN THE MARKET.

Reports from the home market show that it must be heated and ground in a manner somewhat different from other coffees, and that as to quality experts are inclined to put it nearly on a level with best Santos. At present the price is about 25 dollars a pikul,* but this will hardly be maintained. There are now upwards of 15,000 acres under Robusta in the Dutch Indies, mainly in Java, and it is possible that the price may fall to 17 dollars or 18 dollars (about £33-£34 per ton).

PESTS OF ROBUSTA.

Robusta has up to the present shown itself fairly free from parasites, but it can hardly be expected to remain so. Grown side by side with Liberica at Kuala Lumpur it is almost, but not quite, free from leaf disease.

As regards insect pests it is probably as liable as Liberica, if not more so, to their attacks.

ROBUSTA AS A CATCH-CROP IN PARÀ RUBBER AND COCOANUTS.

Many of our soils, especially on hard-backed steep hills, are not over fertile, and it is probable that it is the best in the long run to bring rubber into bearing without catch-crops, which all compete with the principal crop and remove a certain amount of available plant food. But many private owners, small syndicates, and even companies cannot wait five years for a return. A desirable catch-crop should be a crop yielding a good profit; it should not be too severe on the soil; it should bear early; it should admit of weeding so as to leave the land in a clean condition when it is taken out.

Tapioca has been tried and is hardly a success. In fact it is quite undesirable. Apart from the possibility at present prices of its yielding a very small profit, if any, it is so difficult to weed that a large amount of lalang gets in and the land is in a decidedly dirty condition when the crop is removed. Camphor allows the land to be kept clean, but the time to wait for a crop is too long and then the profit is not much. *Coffea robusta* offers by far the best catch-crop. A small return will come in the second year and a good one in the third and following years.

Therefore for those who must put down a catch-crop it is undoubtedly the best. The production of Robusta costs less per pikul than Liberica. The total cost of production should not exceed 12 dollars a pikul, which returns a profit of 6 dollars a pikul on an average price of 18 dollars a pikul. Planted as a catch-crop in the way already recommended, *i.e.*, about 1,000 to the acre, a return of 10 pikuls of market coffee ought to be obtained by the end of the fifth year. This would yield a profit of 60 dollars or over 130 dollars at present prices.

These figures are conservative, judging by the example already given from Java. In the F. M. S. we have not sufficient data on which to base close estimates; but it is evident that if the entire capital cost of the rubber cannot be recovered, at least from the end of the second year it can be more than upkept from the profits on Robusta.

It must be remembered that the cost of planting the coffee has to be added to the cost of bringing the rubber into bearing, but on the other hand owing to the earlier shade the weeding will cost less than in Parà alone.

When rubber has been interplanted in Liberica it is a common fault to let the coffee practically die out. This should be guarded against when the time comes to deal with Robusta. Large Robusta of five years old will compete seriously with Parà. The Robusta should be ruthlessly cut out as soon as the branches of the rubber trees meet and certainly in the beginning of the sixth year.

Planters who wish to know where Robusta seed can be obtained should communicate with the Department of Agriculture, Kuala Lumpur.

* The dollar in Malaya is worth 2s. 4d. The pikul = 133⅓ lb.

WHAT HELPS TO KEEP RUBBER DEAR.

No doubt it would seem reasonable to many minds, if not absolutely certain, that a heavy advance in rubber prices could not fail within a short period to lead to a corresponding increase in the output of rubber. This is the general commercial rule, and consumers of rubber seem generally disposed to apply it to rubber production. In view of present price conditions, however, it may be worth while to consider how the bringing of rubber to market differs from dealing in most other commodities. In the first place, however well systematised the production of rubber may be in portions of the Amazon Valley, this condition does not extend to the whole region, and whatever improvement may be attempted, progress is necessarily slow, if for no other reason than the scarcity of population suitable for gathering rubber.

A large percentage of the rubber gatherers in Brazil to-day remain on the ground temporarily, so that each season a fresh immigration is necessary, very much as if the city of San Francisco should plan to lay new pavements six months in every year, and for each new piece of work should send to Italy for labourers, with the idea that most of them would return home after the work was finished. The rubber which is coming into Parà to-day is being got out by *seringueiros* who were employed as long ago, perhaps, as January last, and most of the rubber to come out during the present cutting season will be the result of similar engagements. The fact that rubber is selling at New York for 1 dollar per lb. more than when rubber gatherers were last employed to go up-river naturally, therefore, will have little effect in the way of increasing this season's output. The high price level can hardly have a widespread effect upon the employment of rubber gatherers before next January, and the crop resulting from engagements made then will not all reach market before the summer of 1911.

But other conditions are to be considered than the labour supply. There is a scarcity of local capital. It is necessary for the *seringal* owner, particularly if far from the primary markets, to be equipped with supplies for his working force in advance for the whole season. And not only this, it is necessary to make advances in respect of immigrants from Ceara, for instance, for their families and for transportation and the like, probably not less than 1 conto [=62·50 dollars] for each labourer secured. It will be seen, then, that the *seringal* owner, in order to increase his present scale of operations, must have considerable capital in order to plan and lay out money practically a year ahead for the purpose. He must apply to the *aviadores* for accommodation, and as will readily be seen these firms are not always able to make larger than accustomed advances.

There are many *seringals* in the lower Amazon districts which for many years have yielded practically a fixed amount of rubber, without regard to the state of the markets. Owing to the habit of many persons in interest in these of living in Europe and drawing on the home houses for funds all the time, there is not always a reserve of capital at home with which to take advantage of new conditions in the market with a view to increased operations if such might prove desirable. It is even less easy to secure means whereby to extend rubber gathering rapidly in more remote districts. Of course, ultimately high priced rubber will lend a stimulant to increased collection, just as the world's growing demand for rubber, without regard to prices, has led to a larger output in nearly every year since the industry had a beginning. But the rate of growth has been too slow to lead to any hope that the increase in prices within the past twelve months will result in such larger production as to reduce prices before very many months to come.

There is to be considered, moreover, the development of new financial conditions on the Amazon, now coming to a head, whereby, with the aid of local banks, rubber may be stored instead of being thrown on the market immediately upon its arrival at Parà, as was so long the case. If this new

condition should have any effect whatever upon prices it will not be to make the price to consumers less. This is so plain as to require no argument.

It seems worth while to refer here to an interview which the "India-rubber World" had seventeen years ago with the Parà merchant Vianna, who gained a reputation for putting rubber prices on a higher basis than had before been known, and doing so more than once, though each time a "slump" followed so quickly as to create a general opinion that attempting to "corner" rubber is bad business. Mr. Vianna said in 1892:—

"I have handled the rubber business in Parà for years, and although it is generally and absolutely known both in the United States and in Europe that through my constant efforts in this market since 1879 the Parà rubber crops have been sold to a much better advantage for the receivers and producers, still this is utterly ignored by said receivers, most of them believing that I have had nothing to do with the keeping and advancing of prices in the long period, although I have devoted all my attention and ability to such business all this time."

This, of course, was Senhor Vianna's compliment to himself, and we have no record of how his contemporaries at the time regarded it. But he said further that with few exceptions the rubber producers in those days and the original handlers of rubber as a rule knew nothing about how the rubber business was done abroad, and implied that his lack of local support prevented his doing more in the way of keeping up rubber prices. As he said:—

"What they know about this business is the difference, when there is one, between the prices offered by two different buyers, and they are smart enough to take the higher price of the two. This embraces all their knowledge about such an important business."

As has been pointed out in these pages, the business of rubber production on the Amazon recently has shown a tendency toward consolidation in the hands of persons with capital and with a broader knowledge of rubber conditions in general than in the past, so that, with the assistance of the banks as referred to, it is possible that concentration and co-operation may be brought about to an extent which would not have been possible in the days of Vianna's former activity in the trade. But the rubber business, back of the primary markets, remains strangely complex, and he would be a bold man who would claim to comprehend all its conditions. It would seem, however, that the conditions here outlined as having a tendency to keep up rubber prices are worthy of study.

There is no new question of ethics involved here. The world needs rubber, and rubber must be forthcoming, the same as ivory and innumerable other commercial commodities, the obtaining of which in the past has involved human slavery. The modern cotton industry depended for years upon human slavery in the Southern United States, but it does not to-day, and cotton is now being grown in many parts of Africa—the home of the former American slaves—by willing and well-paid natives. Ultimately, of course, the same will be true of rubber, though the progress toward the new conditions may be slow.

The hope of the civilisation of the native rubber-producing regions, whether in Africa or in equally remote portions of South America, is in the development of such scientific treatment of rubber production as is now in progress in Ceylon, for example, and which the owners of capital ultimately will insist upon being carried out whatever rubber-trees worth taking care of may be found.

STRANGE GROWTH OF A PARÀ RUBBER TREE CUTTING.

Mr. Bean sends the following curious note on the behaviour of a Parà tree:—"Eighteen months ago on our estate (Puak, Borneo) a three and a-half year old tree was blown down, and the trunk having been cut in two pieces by the Javanese, was used as corner posts for a rough fence. One of these

posts had been rammed in the ground upside down, and after a month began to grow. In three months there were two shoots 18 in. long, which flowered heavily. No fruit resulted, but that was hardly surprising; however, the cutting is still growing, but very slowly."

It is not of course an uncommon occurrence for a piece of living wood of almost any tree, especially soft-wood trees, to put out branches or shoots for some time after the cutting is made, using up in so doing all the food which happens to be stored at the time in the bit; after which, unless by that time the stick has been able to emit roots and feed itself normally, shoots and stick dies. It is, however, unusual for it to grow wrong way up, or to produce flowers.

I have seen, however, a low fence of crossed sticks made of cuttings of branches of Ceara rubber, *Manihot glaziovii*, flowering and fruiting quite heavily.—Ed. Agricultural Bulletin of the Straits and Federated Malay States.

[In New Guinea, the stick fences surrounding the native gardens on Hood's Peninsula, become live hedges in a very short time, whether planted upside down or not.—Ed. "Q.A.J."]

ZAPUPE FIBRE.

Readers of the "Journal" will remember that in December, 1906, we gave an account of the newly-discovered fibre plant, the Zapupe. So far no plants have yet been procurable for Queensland, owing to the enormous demand for them. We learn from the "Agricultural Bulletin of the Straits Settlement" (December, 1909), that a few plants have been obtained by the Director of the Botanical Gardens at Singapore, and the "Bulletin" writes concerning this plant:—

"The Botanic Gardens, Singapore, have lately received a few plants of a new fibre plant discovered in 1905 between Vera Cruz and Tampico. This plant is one of the Agaves, and is known to the natives of Mexico as Zapupe. It seems to have been long known to the natives as a source of very superior fibre, but has only come into cultivation within the last few years. At present, 5,000 acres near Vera Cruz are under this plant, and larger areas are being cleared for its cultivation. It is said that it produces a fine white brilliant strong fibre, flexible and easy to weave. It is superior to other Agaves from this region in its more rapid growth, giving a good return in three years against the usual delay of six or seven years in other species. There are seven known varieties of it. The best one at three years old produces 125 to 150 leaves per year, after which the number gradually diminishes till its seventh or eighth year, giving an average during the whole time of 100 to 120 leaves a year, till it dies in about ten or fifteen years. It prefers a light sandy soil. About 1,000 to 1,400 plants are planted to the acre. They are planted from lateral buds as in the case of Henequen, or Sisal hemp, and produces six or seven buds on the roots each year, and when it poles, it produces 1,000 to 2,500 hulbils, which can be used for planting. The leaves are cut at any time during the year, and care has to be taken to cut them at the level of the stalk, for the plant is apt to die prematurely if carelessly cut. The fibre is prepared by a machine capable of defibrating 20,000 leaves an hour, with the labour of three men. A thousand leaves gives 50 to 55 lb. of fibre—that is, 2½ to 3 tons an acre. The fibre is valued at about £29 per ton, and, as in Mexico the expenses are light, a good profit is obtained. At present the plants in the Singapore Gardens are small, but seem to make a steady growth, and it seems likely to do as well as Sisal, or Mauritius hemp here.

The above notes are taken from Mr. R. H. Millward's Mexican fibre Agaves known as Zapupe. (Trans. Acad. Science, St. Louis, 1909).

PARÀ *V.* RAMBONG RUBBER.

Under the heading "The Passing of *Ficus elastica*," the Ceylon Tropical Agriculturist has the following, taken from the "India Rubber World":—Four years ago the question of the relative advantages of planting *Hevea brasiliensis* (Parà rubber), or *Ficus elastica* (Rambong), was considered an open one, and the fact that the latter was a native tree, and grew freely in Malaya, induced some to prefer it to the Brazilian plant. There are various difficulties attending the treatment of Ficus, in regard to pruning it or allowing it to form its ærial roots unchecked, in relation to tapping and prevention of entrance of boring insects and fungi into the wounds; also the direction and shape of the branches and stems make the collection of latex no easy matter. The yields of dry rubber from Rambong are larger than from Parà, and the market prices excellent. The symmetrical stem of the Parà, the facilities for running the latex into a single cup at the base of the tree, regularity of its growth and its reaction to a wound, have especially commended this tree to the rubber grower, so that Rambong is no longer considered as an alternative on equal terms, and no further estates have been planted with the native plant. From a practical planter's point of view, this choice must perhaps be considered wise; but it is to be regretted that a tree yielding so well and suited to local conditions should have been entirely abandoned. I have been carrying on experiments for some two years past in regard to the proper methods and instruments for tapping *Ficus elastica* (Rambong), and consider that a rotary pricker, in which the pins are at such a distance apart that the latex which runs from the puncture joins that from those adjoining, is a more practical way of extracting the latex than the making of a cut with a knife. If the rubber which flows from the various punctures made with a roller pricker all over the surface of the stem and branches is pulled off directly it has coagulated, it will be found that the flow will occur again, and a second crêpe-like film of coagulated latex can be pulled off. The absence of wound prevents the attacks of borers, and the tree can be again pricked after a short time has elapsed. When the flow from the puncture is too great to allow it to coagulate and it runs down, it can be caught at the base of the tree by means of rubber band or a metal ledge round the tree to lead the latex into a cup or other receptacle. If a flow of latex is preferred to the crêpe-like scrap I have described, then an application of water by a brush or spray will run the latex down to the base of the tree, where it can be caught.

These questions are, however, becoming of minor importance in the Federated Malay States, as the passing of *Ficus elastica* has begun, and each year sees less of this interesting and profitable tree cultivated.

VANILLA CULTURE FOR TROPICAL QUEENSLAND.

By HOWARD NEWPORT, F.R.H.S., Instructor in Tropical Agriculture.

RETURNS.

The amount of crop obtained depends, of course, on the size—in this case the length of the vine. One cluster to a yard of vine is a good crop, and a five or six year old vine may produce as many as twenty to thirty clusters. It is not always advisable to let the vine produce a pod for every blossom worked even if it should set. Overbearing must be guarded against, as it stops the growth of the vine, as well as weakens it; and small-sized, thin pods are obtained, followed by a materially lessened crop the next year on account of the paucity of new growth, from which the best flowering is obtained.

When vines are bearing as much as stated above, therefore, only five or six pods are allowed to form; but with a lesser flowering up to ten or even twelve pods may safely be allowed in each cluster.

The first flowers on the cluster are said to produce the finest looking pods, but the last flowers the best in point of quality and aroma. If, however, a number of the first flowers have been set, the pollination of the later ones is uncertain. Also the flowers hanging directly downwards on the cluster give straighter pods, which are easier to cure, while those from the flowers growing upward develop a bend in the pods which is difficult to eliminate without splitting later on.

Generally it has been found advisable to go on pollinating the flowers until more than are required have been set on each cluster, when the undesirable and crooked embryo pods are nipped off with the finger and thumb. Pods grown under excessive shade are long, thin, soft, and difficult to ripen, being apt to dry and wrinkle too much; pods from vines in too exposed or sunny situations on the other hand are fat, round, and firm, with more flavour, but have to be watched and harvested promptly, as they generally evince an early tendency to split either before harvesting or during the early processes of curing.

A very wet season usually results in a poor crop, and a very dry one in weak pods. Seasons with sufficient rain but well defined dry periods are necessary for uniform and even crops, but as seasons generally vary the Vanilla crops fluctuate on the best of plantations.

Some fifty to sixty pods per vine, obtained from eight or ten clusters of five to seven each, or five or six clusters of ten to twelve each, would be a crop that might reasonably be expected from five to six year vines in Queensland without being over sanguine. This would represent about $\frac{1}{2}$ lb. of dry, marketable Vanilla per vine.

Old plants, both in Mexico and the Seychelles, have been known to produce 200 clusters and 1,000 pods representing nearly 10 lb. of marketable Vanilla, but what is called a "bumper" crop, such as this, though always within the range of possibility under favourable conditions, is unusual, and not to be calculated upon.

RIPENING OF PODS AND HARVESTING.

The pod, as already stated, commences to grow almost immediately on the successful attainment of the fecundation or pollination. This rapid growth continues for a month or six weeks, by which time the pod is about the size and length of an average lead pencil. The process of maturing is much slower, taking five or six months longer. From the pollinating of the blossom to ripening and harvesting of the pod seven to nine or even ten months may elapse, according to the season and the amount of shade. It is better that the pods do not ripen too quickly, and about nine months is the usual time.

Ripeness is indicated by the pod turning yellow. Before the pod has turned completely yellow, however, it usually splits, and as split pods obtain a lower price, the pods must be picked as soon as the least yellowish tinge is observed at the lower end.

In picking, the pod should be grasped by the whole hand and twisted upwards or sideways; if simply pulled either the pod breaks, the whole cluster comes away at once, or the vine is torn. As pods ripen in about the same order as the flowers were fertilised, the process of collection is somewhat slow, and must be continued daily as long as necessary. If harvested too green they are difficult to cure, and develop but little aroma.

CURING.

In the green state the Vanilla pod has little or no aroma or flavour, and more or less treatment is always necessary. The object aimed at in this treatment is to endow the beans with keeping qualities, develop to as great extent as may be possible the characteristic aroma, &c., and to attain the colour and condition required for the market.

The first step in the process is the stoppage of vegetation, usually accomplished by heating or dipping into hot water; the second is colouring by a covering up in blankets, &c.; the third, sweating to dispose of moisture, &c., by alternate covering and exposure to the open air and sun, and wiping; and the last step, handling to ensure evenness and straightness, &c.

There are a large number of different methods of attaining these objects, the processes in almost every country where Vanilla is commercially produced differing in one or more respects.

The first object is attained by heating in an oven or dipping into hot water. The latter process is the simplest and best adapted for small growers in Queensland. On being picked the beans are roughly sorted into two sizes, large and small. These are placed separately in a clean basket, and dipped for about twenty seconds in a cauldron or copper of water just off the boil; 190 degrees Fahr., is the correct temperature (212 degrees Fahr. being boiling point). This dipping should be done twice at intervals of not more than a minute for the small pods, and three times for the large. If the water is very hot the time may be shortened somewhat, and if cooler the basket of pods should be kept in a few seconds longer. In some places the pods are strung together before such dipping, but this is unnecessary. The next process, that of colouring, follows immediately. As soon as the water has drained off, and without allowing the Vanilla to get cool, it should be put into a box lined with or containing folds of blanket, doubled up thick hessian, or clean sacking —an old blanket is best. The two grades may be put in the same receptacle if kept separate by a fold of the material, and the whole covered well in and the box shut. If the heat has been well kept in, by morning the pods will have all turned a light coffee colour, and will have lost their brittleness.

It is now necessary to begin the third or sweating process, which consists in drying entirely in the shade for the first few days, and subsequently a few hours each day in the sun, carefully wrapping up and replacing it in the box and blanket every night. The result will be a sweating out of the moisture by night and evaporation of it by day, which generally involves a loss by the completion of the process of anything up to 75 per cent., generally about 50 per cent., of the weight of the green pods. Should there be any indication of mildewing, the pods must be carefully wiped, and care must be taken to prevent their ever getting wet by being left exposed to rain or dew. This drying is in some places and under certain conditions done by the use of chloride of calcium ($CaCl_2$), and the sweating by flannel-lined boxes with glass lids, especially to prevent any possibility of damping by sudden showers, &c. On large plantations special drying houses are built of corrugated iron or wood with shelves, trays, and arrangements for keeping various temperatures in different rooms of the house of from 110 degrees to the normal temperature of the atmosphere. Where thousands of pounds of Vanilla are dealt with, such drying houses are necessary, but for small quantities a few trays of hessian, which will occupy but little room in the house, veranda, or barn, are sufficient. When the weather remains damp and mildewing may be persistent, it may be necesary to resort to charcoal braziers to make sure of drying.

The last process is that of manipulation. The finishing off of the drying should be done in the shade, during which each pod should be handled daily. This handling consists of gently squeezing or smoothing the pods with a sort of massage action *from the tip towards the butt* so as to evenly distribute the contents, which otherwise might collect at the tip or lower end; and straighten the crooked ones. While this is being done the pods are sometimes wiped with olive, mahogany, or nut oil; in fact, any oil that does not go rancid. This is not important, and might be overdone, though a little olive oil on the fingers gives the beans a finish and makes the work easier. During this process also any pods showing a tendency to split are tied with cotton, and those showing any tendency to mouldiness are put back for further sweating and drying in the sun.

When finished curing the pods should look smooth, even, and glossy, not too wrinkled, be pliable enough to twist round the thumb without breaking or splitting, and have a strong and characteristic aroma. The whole process of curing may take two months, but need not take up a great deal of time each day.

SORTING, GRADING, AND PACKING.

In the stage now arrived at the pods should average about 100 to the lb. The largest, or 8 in., or larger pods, if fairly full, not emaciated looking, will run about 75; and the small curly ones 150 to 160 to the lb. Anything less in weight than this would be either very small, very poor, or too dry.

The easiest way of grading is for the operator to sit at a cloth-covered table with the Vanilla in a heap in front of him (or her, for this work, as well as the packing, can often be done better by the gentler sex). A piece of thin wood some 6 in. wide and 1 ft. long is required for the grading board, which should have a narrow ridge about ½ in. high across one end, and have marked across it clearly with ink, or better still a shallow groove, the lengths from 3 in. to 9 in. from the end ridge in half-inches. The Vanilla pods or beans are laid on this with their ends against the ridge, when the length is readily and quickly seen. They are then laid in heaps of their respective sizes. Each ½-in. constitutes a grade, and any intermediate lengths go into the grade above—*e.g.*, anything over 7½ in. is put in the 8-in. grade, and so on. This grading is much more quickly done than might be gathered from the description, and is necessary for the subsequent operation of tying. When a quantity has been thus graded, eighteen or twenty are taken up in the hand, with their ends all one way, and being laid evenly are wrapped twice round the middle with a piece of tape or raffia fibre sufficiently tight to hold well together; this is not tied, but while being still held in one hand good pods, the longer ones for preference of that grade are picked out and laid round the bundle. When all are straight the tip ends are tied with raffia fibre or soft twine fairly tight. The butt ends are twisted so that the small curl (which is unavoidable) turns inwards, and that end is similarly tied, and the twist of tape, or what not, that had been put round the first bundle, which is now the core of the completed bundle, is gently withdrawn. An outside tie round the middle of the bundle may be dispensed with if the beans lie fairly close and straight. Damp raffia fibre is mentioned as being used in some countries, and is easy to tie with, but should be avoided as inducing mildew. A bundle may consist of about twenty-five beans—more or less—an effort being made to keep the bundles as nearly as possible of a size, so that a few more will be required if the beans happen to be thin and a few less if thick. Thus the bundles will run from three of the long to six of the short beans to the lb.

These bundles may be packed into boxes of 5, 10, or even 20 lb., each grade being kept separate. Allied grades, such as sevens to eights, or fives to sixes, may be put into the one box if divisions of some kind, even if only of paper, are used.

Tin boxes are generally used, but dry, light, and scentless wood would do. In either case it is advisable to line the boxes with oiled paper before packing the Vanilla. Also, to make quite sure of the keeping qualities, it is advisable to keep the boxes for a week or two and repack, removing for re-treatment any bundles showing mould before despatch. If properly cured there should be none of this, but a bad bundle or even pod may spoil a considerable amount if left. At this stage the beans should not be rewiped or handled much, as they may begin to "frost." This frosting is caused by the vanillin—the active principle of the Vanilla, which in the course of curing gradually permeates the whole fruit—crystallising on the outside of the beans. Vanilla showing this crystallisation is thought highly of, and obtains a better price than those without frost. Once finally packed the boxes should be hermetically sealed with pasted paper.

USES, VALUES, ETC.

Vanilla is used for perfumery, essence making, and flavouring, more especially perhaps for flavouring chocolate. A market is, therefore, to be sought among the wholesale confectioners and manufacturing grocers, &c. There is a large consumption in the Commonwealth already, to meet which the Vanilla beans are imported. The market is ruled by the Home and Eastern markets. The latest quotations from Ceylon are 8s. to 16s. per lb., according to quality; the points on which the value is determined being the length, appearance, and, of course, strength of aroma, and flavour. Uniformity of grading and neatness of packing—*i.e.*, general "get up," in this, as in most products, has a by no means inconsiderable bearing on the favourableness of its reception on the market.

Synthetic—*i.e.*, chemically-made Vanilla substitutes, have, as already stated, held the market for some time, but their use with the assistance of the Pure Food and Drugs Act is gradually giving place to the true and pure article, which is not only above suspicion with respect to wholesomeness, but the fragrance of which is said to "act on the system as an aromatic stimulant, exhilarating the mind and increasing the energy of the animal system."

The synthetic product called "Vanillin" is said to be obtained from eugenol, the foundation of the oil of cloves, and also from sugar by electrolytic process.

Scrub brushed so as to leave 250 tree trunks per acre, and two vines planted to each, producing an average of twenty-five to thirty pods per vine, which, in turn, on curing average, say, 125 to the lb., would give a return of 100 to 120 lb. of marketable Vanilla per acre, which at an average of 10s. per lb. represents £50 to £60 per acre. These are figures which have been shown to be readily attainable by the experimental plot at the Kamerunga State Nursery, Cairns, and which might probably be easily exceeded by devoting more detailed attention to the plantation than was possible in the above instance.

The profit per acre is quoted in the Seychelles as £250, and in Tahiti at £120 or so. The Kamerunga experiment plot was not large enough to definitely determine the area one man could work, but it has shown that the statement quoted from the Seychelles—viz., that one man can look after 2,500 plants—is equally applicable to Queensland. According to the above distance of planting this would give us 5 acres and a gross return of £250 to £300 as possible for one grower. Cost of production at the same rate of calculation would amount to about £100—*i.e.*, £20 per acre, or some 4s. per lb., against a present average value of 8s. to 10s. per lb. for the product.

The cost of opening up a 5-acre plantation of Vanilla should not exceed £200, as follows:—

	£
Land at £4 per acre	20
Fencing, 30 chains, at 6s. per chain	9
Brushing, at 12s. per acre	3
Plants (at present scarce in Queensland), say ...	20
Planting, at 20s. per acre	5
Tending till bearing, including pegs, supports, &c.—two years	108
Drying-house, trays, &c., and sundries	35
Total	£200

This, however, does not necessarily represent the capital necessary, especially in the case of a settler opening a Vanilla plantation as an auxiliary crop on his already running farm. In this case, allowing that he himself tended the plants till bearing, the outlay would be confined to brushing the scrub, cost of plants, and planting.

CONCLUSION—SUMMARY.

Conditions Necessary for Vanilla.

Climate.—Tropical humid; rainfall, 60 to 100 in. or more, well distributed, but with a well-defined dry season of two or theee months. Mean temperature, about 75 degrees to 80 degrees Fahr.

Soil.—Vegetable mould—*i.e.*, ordinary scrub soil of 6 in. or more in depth, with, by preference, a well-drained subsoil.

Situation.—Gentle slope or flat land, well protected from wind; avoid wet hollows.

Clearing.—Brushed scrub, leaving 250 trees or so per acre, not too dense shade—*i.e.*, so that some chequered sunlight is obtained by the vines.

Plants.—Cuttings 2 ft. to 4 ft. long.

Planting.—One on either side of each tree trunk—*i.e.*, about 500 per acre, about December or January.

Cultivation.—Pulling down climbing vines above 6 ft. high from trees, and draping over supports, about twice in the season. Keeping roots mulched where exposed. Pollinating flowers—September to November.

Harvesting.—Gather pods every two or three days at least—July to September.

Curing.—Dipping, colouring, sweating, drying, and handling. Grading and packing for market.

Marketing.—Wholesale confectioners, &c. Prices, 8s. to 16s. per lb.

Returns—100 to 120 lb. per acre of 500 vines.

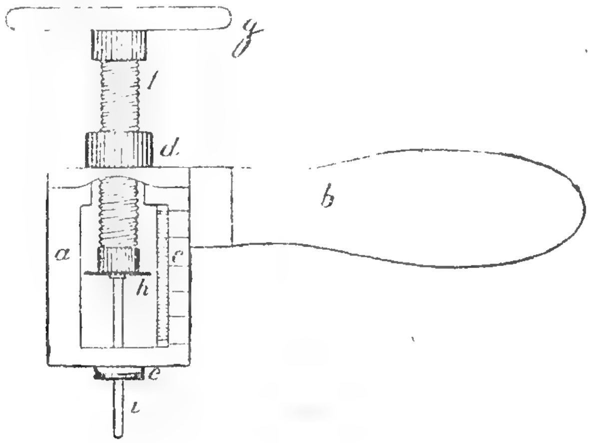
Cost of Production, &c.—Estimated cost of opening 5-acre vanillery, £40 per acre, including cost of land and labour, but not living expenses, till bearing. Cost of production estimated at not more than 4s. per lb. marketable Vanilla.

A SUBSTITUTE FOR RUBBER.

Those who are familiar with the fortunes made in the rubber industry, says the "Australasian," will learn with interest of an Australian discovery which, it is claimed, makes an efficient substitute for its raw material. Like all great inventions, the new process is exceedingly simple. Discovered by Mr. Gayner, of Middle Park, Victoria, it consists, briefly, in anointing the surface of some fabric, such as canvas, with a special glutinous vegetable product possessing remarkable qualities. The application of this mixture to the fabric not only endows it with all the qualities of rubber, but, in addition, creates a tyre which is proof against deflation from ordinary punctures. The self-sealing characteristics of tyres and inflated goods made on this principle form one of their most valuable qualities, and will readily appeal to the legion who have had experience of puncture troubles. Additional features in favour of the discovery are that tyres made under its process are as resilient as rubber, while the cost of manufacture is not more than one-half, and is likely to be reduced as manufacturing operations expand. The syndicate which has been behind the inventor has thoroughly tested the process, and is now taking steps to float the Australian rights into a company.

AN INSTRUMENT FOR DETERMINING THE THICKNESS OF THE BARK OF *HEVEA BRAZILIENSIS* (PARÀ RUBBER TREES).

A notice appears in the "Journal d'Agriculture Tropicale" (January, 1910), also an illustration of an ingenious little instrument, which should be of great use to growers of Parà rubber, for ascertaining the thickness of the bark of the tree, when ready for tapping. The instrument, of which we reproduce the diagram, consists of a blunt needle, running in a brass framework, in which it is set in motion by the action of short threaded screw, worked by the nut G.



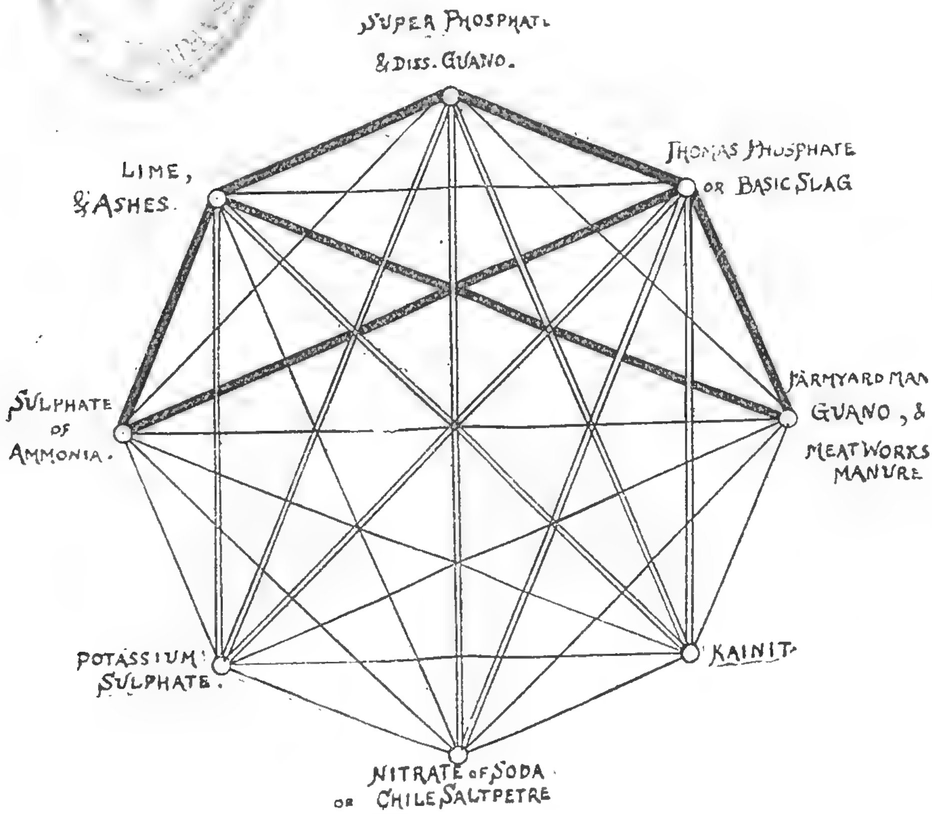
Between the needle and the screw F, there is a small disc H, the edge of which slightly touches a graduated scale C, fixed to the side of the frame. The apparatus is furnished with a handle B. To use the instrument, the screw is turned until the entire needle is exposed, which is then forced into the bark until it comes in contact with the wood. The screw is then reversed to enable the disc to descend till it touches the bark, care being taken not to release the needle. This done, the needle is withdrawn by turning the screw until it touches the edge of the disc. The reading of the scale gives them in millimetres the depth to which the needle has penetrated, and consequently the thickness of the bark. The price of the apparatus is 19 francs (15s. 10d.).

POTATO BLIGHT.

Farmers will do well to closely examine the growing potato crops for indications of any such disease as the Potato Blight *(Phytophthora infestans)* or Brown Rot (bacterial disease), and should any such disease appear to be present, they should adopt the precautionary measures recommended by Mr. H. Tryon, Vegetable Pathologist, in his article on the "Inspection and Treatment of Potatoes," published in the March issue of this Journal (p. 145), in which he recommends spraying with Bordeaux mixture, to which arsenate of lead, or arsenite of soda should be added. It is only by adopting such means of protection that the grower is enabled to save his own crop, and, what is even more important, prevent the spread of disease in his district.

Chemistry.

ANALYSIS OF FERTILISERS.



Mixing Fertilisers.

Manures joined by a *heavy black line* should never be mixed together.

Those connected by a *double line* must only be mixed immediately before use.

Those joined by a *thin single line* may be safely mixed together at *any time*.

The above explanation of the diagram was omitted in Mr. Brünnich's paper on "Analysis of Fertilisers" in the last (April) issue of the Journal.

CLARITE PROCESS OF CLARIFICATION.

Mr. J. C. Brünnich, Agricultural Chemist to the Department of Agriculture and Stock, furnishes the Under Secretary with the following addition to his previous report on comparative trials of the "Clarite" Process and the ordinary Lime Clarification, carried out at the Meadowlands Mill at Mackay:—

"In my report on the supervision of trials carried out with the "Clarite" Process and the ordinary Lime Clarification at the Meadowlands Mill at Mackay, I mentioned the fact that one of the objections raised against

the use of the Clarite Process was the keeping quality of the sugar. At that time I already stated that from my previous experience on the keeping quality of sugars, I was convinced that sugars containing lime salts are more liable to deterioration than sugars manufactured by the new process. This opinion has been clearly demonstrated by the repeated analyses of two samples of sugar, manufactured at that mill within a few days of each other by the two different processes. The sugars originally showed very little difference; in fact, the lime sugar was slightly better, and had a decidedly better colour.

"The two bags of sugar, each containing 56 lb., were kept side by side in a small dry room, exposed to the ordinary changes of temperature and moisture. The intermediate samples, after keeping the sugar two and five months, were taken with a proof stock, in order to avoid unnecessary exposure of the sugar, and, therefore, may not represent such true average samples as the last samples in which the whole contents were thoroughly mixed and sampled for analysis."

"We find, therefore, that the sugar clarified with lime showed a loss of cane sugar of 2·1 per cent., and a falling off in the net titre from 96·88 to 93·06, after being kept for seven months. The clarite sugar shows a slight increase in quality, due to a slight loss of moisture. The lime sugar showed a distinct stickiness, and possessed the peculiar stale musty smell of the raw sugar, kept stored for some time, whereas the clarite sugar had the pleasant fresh smell of newly-manufactured raw cane sugar. This great advantage of the clarite process of producing a sugar of such excellent keeping quality entitles the process to further careful trials by our sugar mills."

Times of Sunrise and Sunset at Brisbane, 1910.

Date.	May.		June.		July.		August.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·30	5·0	6·39	5·4	6·30	5·18
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·31	5·0	6·39	5·4	6·28	5·19
5	6·15	5·13	6·32	5·0	6·39	5·5	6·28	5·20
6	6·16	5·13	6·32	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·6	6·26	5·21
8	6·17	5·11	6·33	5·0	6·39	5 6	6·26	5·22
9	6·17	5·11	6·34	5·0	6·39	5·6	6·25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·34	4·59	6·39	3·7	6·23	5·23
12	6·19	5·9	6·35	4·59	6·39	5·8	6·22	5·24
13	6·20	5·8	6·35	4·59	6·38	5·8	6·22	5·24
14	6·20	5·8	6·36	4·59	6·38	5·9	6·21	5·25
15	6·21	5·7	6·36	4·59	6·38	5·9	6·20	5·25
16	6·21	5·6	6·36	5·0	6·38	5·10	6·19	5·26
17	6 22	5·6	6·37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·5	6·37	5·0	6·37	5·11	6 17	5·27
19	6·23	5·5	6·37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6·37	5·0	6·36	5·12	6·15	5·28
21	6·24	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·25	5·3	6·38	5·1	6·36	5·13	6·14	5·29
23	6·25	5·3	6·38	5·1	6·35	5·13	6·13	5·29
24	6·26	5·3	6·38	5·1	6·35	5·14	6·12	5·30
25	6·26	5·2	6·39	5·1	6·34	5·14	6·11	5·30
26	6·27	5·2	6·39	5·2	6·34	5·15	6 10	5·31
27	6·27	5·2	6·39	5·2	6·33	5·15	6·9	5·31
28	6·28	5·1	6 39	5·2	6·33	5·16	6·8	5·31
29	6·28	5·1	6·39	5 2	6·32	5·16	6·7	5·32
30	6·29	5·1	6·39	5·3	6·32	5·17	6·5	5·32
31	6·29	5·0	...	...	6·31	5·17	6·4	5·33

Phases of the Moon.

Date	Phase	H. M.
2 May	☽ Last Quarter	11 30 p.m.
9 "	● New Moon	3 33 "
16 "	☾ First Quarter	0 13 "
24 "	○ Full Moon	3 39 "
1 June	☽ Last Quarter	8 25 a.m.
7 "	● New Moon	11 16 p.m.
15 "	☾ First Quarter	2 19 a.m.
23 "	○ Full Moon	6 12 "
30 "	☽ Last Quarter	2 39 p.m.
7 July	● New Moon	7 20 a.m.
14 "	☾ First Quarter	6 24 p.m.
22 "	○ Full Moon	6 37 "
29 "	☽ Last Quarter	7 35 "
5 Aug.	● New Moon	4 37 p.m.
13 "	☾ First Quarter	0 1 "
21 "	○ Full Moon	5 14 a.m.
28 "	☽ Last Quarter	0 33 "

General Notes.

DRYING MANGOES.

The drying of mangoes is a very simple process, given favourable climatic conditions. In reply to an inquiry by the Department of Agriculture and Stock, as to the process adapted in Hawaii, the following information was courteously supplied by Mr. R. S. Hosmer, Superintendent of Forestry, Honolulu. That gentleman forwarded two letters on the subject, one from Mr. Roberts, of Palama, Honolulu, the other from Mr. W. E. Rowell, of Honolulu. The former writes:—

"Regarding the drying of mangoes, the process is very simple, but only applies to a hot, dry climate; some summers even in Oaku are not hot enough. Ripe mangoes are peeled and sliced into five pieces, and laid on wirework slats in the sun for three to four days. Each day they are turned over so as to dry thoroughly and prevent curling. I put them in double paper bags and in 10 lb. tin cans, and they kept good for six months. Put up in wooden boxes, a maggot got at them, the same way as prunes are attacked. I suppose sulphuring or the use of lye would preserve them." Mr. Roberts further says:—

"Another article of food made from mangoes is called 'Amsath.' This is an Indian delicacy. Ripe mangoes are peeled and put in a stout canvas bag, and the juice is squeezed out. The juice is then poured into shallow pans (coated with butter or lard), about one-sixteenth of an inch thick or a little more. In a few hours (being placed in the sun) it becomes dry, and can be taken off, and rolled up, when it makes a delicious preserve or candy. I cannot state how long this will keep, as it was all eaten in less than two months after making, but I can recommend it."

Mr. Rowell writes:—"I dry the mangoes in the sun under a glass roof to protect them from showers. There is no patent on the process. The difficulty is to keep the moths from laying eggs on the fruit while drying. With artificial heat that trouble would be eliminated. When the drying and packing problems are solved the market will have to be worked up."

SUGAR FROM THE MAIZE PLANT.

It is ten years since it was demonstrated that sugar could be produced from the maize plant under proper conditions of management as effectively as from the sugar-cane. Hitherto the production of maize sugar has remained in the experimental stage; but now it is declared that the process is to be carried out upon an extensive commercial basis in the United States during the present year. Observations made in the course of the experimental undertaking are said to have brought to light unsuspected powers on the part of the plant to transform much of its constituents into cane sugar, with other changes consequent upon the removal of the immature ear. The life of the plant is greatly prolonged when climatic conditions are favourable. The stalk remains soft and capable of continued expansion, and fresh supplies of sugar are produced. Some important by-products are said to add to the value of the new undertaking. To feeders of live stock, any prospect of the diversion of the plant from the production of grain is unwelcome.

Answers to Correspondents.

DWARFING FRUIT TREES.

"ORCHARDIST," Blackall Range.—

The method of dwarfing fruit trees is kept secret by the Japanese, but a Japanese garden artist, Mr. Suburo Eida, has explained some of the secrets of culture at the coming Shepherd's Bush (England) Exhibition. There will be some dwarf Wistarias covered with bloom, and 200 years old. Mr. Eida said that the secret of dwarfing was continual labour along the following lines:—After some years' growth the taproot is cut; then, every year, the tree is repotted, with necessary root trimmings; and, for the rest, growth is arre ted by continually changing the tree from dark rooms to light rooms and from cold to hot, with immense care in supplying the exact amount of water.

We cannot understand how an orange-tree can be dwarfed as we have seen it, after several years' growth, for the tree in six years would be 8 or 10 ft. high, so the secret is still a secret, notwithstanding Mr. Eida's explanation.

TROPICAL PLANTS AT WARRA.

"SETTLER," Tara, Warra—

Neither rubber, cacao, papaw, or kola nut would survive the heavy frosts experienced at Warra. A clay subsoil would also be bad for these tropical plants, which require rich deep soil, as well as a hot moist climate throughout the year.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1909.										1910.		
	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov	Dec.	Jan.	Feb.	Mar.
North.													
Bowen	1·06	1·15	2 32	1·98	1·23	0·13	0·21	0·36	3·15	19 98	15 45	7 10	21·45
Cairns	21·03	14 19	1·06	2·48	0·65	2·48	0 7	3·19	7·31	15 24	21 80	17 12	24·16
Geraldton ...	37·31	28·51	5·98	9 13	6 53	5·32	0·36	6·71	14·57	19·98	20 35	34 57	33 74
Gindie State Farm ...	...	...	...	...	...	...	...	..	...	...	..	...	...
Herberton ..	3·52	0·70	0·81	1·22	0 20	0·75	0·50	2·30	4 50	5·11	16·64	12 21	12·40
Hughenden .	2·86	...	Nil	1·71	1 37	0·33	0·8	1·95	0·54	8·01	4 52	3·69	2·95
Kamerunga State Nurs.	...	4·95	0·97	...	...		...		.	...	...	..	...
Mackay	9·00	2·59	2·33	2·05	4·00	0·75	0·73	2·88	3·18	25·56	35·28	9 73	24 31
Rockhampton	1·68	1·21	0 03	1·33	2 99	1·37	1·20	2·16	4·55	2·74	11·93	1 28	19 84
Townsville	7·01	1·28	1·07	1·51	0·83	0·57	0·12	2·07	1·31	11·51	23 07	10 85	17·21
South.													
Biggenden State Farm	2·45	2·00	0·72	2·60	4·01	1·78	0·29	...	2 83	6 96	7·22	3·99	3·82
Brisbane	2·65	4·07	0·82	1·75	2·10	2·44	2·74	1·56	4 14	6 45	7·24	4 19	6 42
Bundaberg	5·06	1·54	0 67	1·51	5·65	1 66	0·98	0 42	3·55	2 99	11 81	2·43	8·92
Dalby	0·99	1·60	Nil	1·87	1·19	3 13	0·47	1·92	2·13	2 45	10 68	1·33	3 87
Esk ...	3·27	5·03	0·36	2·43	2·71	3 31	2 60	2 61	2 69	9 20	8 60	1·94	6·09
Gatton Agric. College	3·18	3·82	0 32	1·22	2·02	2·09	2 29	1 87		3 92	11 79	..	3·66
Gympie	3·41	2·34	1 15	2·96	4 70	2·80	1 70	2 3	3·8	16 54	5·92	3·48	7·74
Ipswich	2·66	4·56	0 05	1·3	1·67	1·34	3·55	1·93	1·56	4 72	6 91	2 78	3·56
Maryborough	2 28	2·4	0 91	2·57	5 02	2 53	1·56	0·51	3.94	6 83	5·65	2 99	3·92
Roma	4·18	1·91	0 44	2·73	1·54	4 83	0·12	0 90	2 12	1·05	4·74	1·47	8·36
Roma State Farm ...	...	..	...	...	...	...	...	...	...	...	.	..	...
Tewantin	4·34	9·37	1·00	3·24	4 08	4·24	1·38	3·8	1·90	8 85	5·96	3·42	15·18
Warwick ..	1·30	2·21	0·70	1·23	2·01	2 28	1 77	2 85	2·77	4·25	3·93	3·14	2·57
Wellington Point ...	...	...	...	...	...	...	...	...	...	9·00	...	...	...
Westbrook State Farm	1·43	...	...	...	...	..	...		...	.	...		...
Yandina	3·71	5·25	1·10	2·70	3·70	5·81	3·84	2·30	0·76	20·18	6·71	2 07	11·81

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	APRIL. Prices.
Apples (Eating), per case	5s. to 7s.
Apples (Cooking), per case	5s. to 6s.
Bananas (Cavendish), per dozen	2d. to 3d.
Bananas (Sugar), per dozen	$1\frac{3}{4}$d. to $2\frac{1}{4}$d.
Custard Apples, per quarter-case	3s. to 4s.
Grapes, per lb.	2d. to $2\frac{1}{2}$d.
Lemons (Italian), per large case	17s. to 18s.
Lemons (Lisbon), local, per case	4s. to 5s.
Mangoes, per case	1s. 3d. to 4s.
Oranges (Local), per case	2s. 6d to 3s. 4d.
Papaw Apples, per quarter-case	1s. to 2s. 6d.
Passion Fruit, per quarter-case	4s. to 6s.
Peaches, per quarter-case	2s. to 3s.
Pears, per case	3s. 6d. to 5s.
Persimmons, quarter-case	1s. to 2s.
Pineapples (Ripley Queen), per dozen	3s. to 5s. 6d.
Pineapples (Smooth), per dozen	3s. to 5s.
Pineapples (Rough), per dozen	2s. 6d. to 5s.
Plums, per quarter-case	1s. 5d. to 4s. 6d.
Quinces, per case	3s. 6d. to 4s.
Rock melons, per dozen	1s. 6d. to 2s.
Tomatoes, per quarter-case	6d. to 2s. 9d.
SOUTHERN FRUIT MARKET.	
Apples (Local), choice, per case	7s. to 8s.
Apples (Jonathan's), per case	5s. to 6s. 6d.
Apples (Cooking), per case	4s. to 5s.
Bananas (Queensland), per case	8s. to 8s. 6d.
Bananas (Queensland), per bunch	1s. 6d. to 3s. 6d.
Bananas (Fiji), per case	13s. to 14s.
Bananas (Fiji), per bunch	4s. to 10s.
Cocoanuts, per dozen	1s. 9d. to 2s. 6d.
Grapes, per 12 lb. box	3s. to 5s.
Lemons (Italian), per half-case	10s. to 11s.
Lemons (Local), per gin case	5s. 6d. to 6s.
Oranges (Local), per case	5s. to 6s.
Oranges (Italian), per case of 100	13s.
Passion Fruit (choice), per half-case	4s. 6d. to 5s.
Peaches, per half-case	5s. to 5s. 6d.
Pears (choice), per gin case	7s. to 8s.
Peanuts, per lb.	$5\frac{1}{2}$d.
Persimmons (choice), in half-case	2s. 6d. to 3s.
Pineapples (Queensland), Ripley, per case	5s. to 6s.
Pineapples (Queensland), common, per case	3s. 6d. to 4s. 6d.
Pineapples (Queensland), Queen's, per case	5s. to 6s.
Plums, per half-case	2s. 6d. to 3s.
Quinces, per gin case	3s. to 3s. 6d.
Rock melons (Queensland), double case	4s. to 4s. 6d.
Tomatoes, per half-case	1s. 6d. to 3s.
Water melons (Queensland), large, per dozen	5s. to 6s.
Water melons (Queensland), medium, per dozen	3s. to 4s.

As anticipated, the price of bananas in the Southern Markets has advanced 1s. all round, stocks being light and supplies not forthcoming. On 19th April, prices were as follow:—Gros Michel bananas, 16s. to 17s. per case, 5s. 6d. to 11s. 6d. per bunch. Fiji bananas, 15s. 6d. to 16s. per case, 4s. 6d. to 8s. 6d, per bunch; loose bananas, 7s. 6d. to 8s. 6d. per case. Queensland bananas, 12s. 6d to 13s. 6d. per case, 2s. 6d. to 5s. 6d. per bunch.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR APRIL.

Article.		APRIL. Prices.
Bacon, Pineapple	lb.	8½d. to 10½d.
Barley, Malting	bush.	3s. to 3s. 6d.
Bran	ton	£4 15s.
Butter, Factory	cwt.	102s.
Chaff, Mixed	ton	£3 10s. to £4 10s.
Chaff, Oaten	,,	£4 10s. to £4 15s.
Chaff, Lucerne	,,	£4 5s. to £4 15s.
Chaff, Wheaten	,,	£2 10s.
Cheese	lb.	1½d. to 3d.
Flour	ton	£10 5s. to £10 10s.
Hay, Oaten	,,	£5 15s.
Hay, Lucerne	,,	£1 15s. to £3
Honey	lb.	2½d.
Maize	bush.	2s 7d.
Oats	,,	3s. to 3s. 2d.
Pollard	ton	£4 15s.
Potatoes	,,	£5 15s. to £8
Potatoes, Sweet	cwt.	1s. 2d. to 1s. 3d.
Pumpkins	,,	2s.
Wheat, Milling	bush.	3s. to 3s. 9d.
Wheat, Chick	,,	2s. to 2s. 1d.
Onions	ton	£5
Hams	lb.	11½d. to 1s. 1½d.
Eggs	doz.	1s. 4½d. to 1s. 10d.
Fowls	pair	2s. 3d. to 3s. 6d.
Geese	,,	6s. to 6s. 4d.
Ducks, English	,,	3s. to 4s. 6d.
Ducks, Muscovy	,,	3s. to 4s. 6d.
Turkeys (Hens)	,,	6s. to 7s.
Turkeys (Gobblers)	,,	9s. to 12s. 6d.

ENOGGERA SALEYARDS.

Animal.	APRIL. Prices.
Bullocks	£8 to £9.
Cows	£6 7s. 6d. to £8.
Merino Wethers	18s.
Crossbred Wethers	17s. 9d.
Merino Ewes	15s. 3d.
Crossbred Ewes	14s. 9d.
Lambs	14s.

Orchard Notes for June.

By ALBERT H. BENSON, M.R.A.C.

THE SOUTHERN COAST DISTRICTS.

The Notes of last month, referring to the care to be taken in the handling and marketing of all kinds of citrus fruits, apply with equal force during this and subsequent months till the end of the season.

Keep the orchard clean, and work the land to retain moisture. The handling of the citrus crop is the main work in many orchards, but where slowly acting manures are to be given their application should not be later than this month. They should be well mixed with the soil, so that when the Spring comes and the trees start a fresh growth a certain percentage of plant food will be available for the trees' use. Heavy pruning should be done now, whilst the trees are dormant. All large limbs should be cut off close to the main stem; the edges of the cuts should be carefully trimmed, and the whole wound, if of large size, covered with paint or grafting wax, so that it will not start to decay, but soon grow over. When the soil of the orchard is becoming deficient in organic matter, the growing of a winter green crop, such as mustard or rape, is well worth a trial. Clear the crop of fruit from the part of the orchard to be so treated. Plough the land well; work the soil down fine so as to get a good seed bed, and broadcast the mustard or rape. A manuring of 4 cwt. of meatworks manure and 1 cwt. of sulphate of potash per acre will produce a very heavy crop of green manure, and the plant food not required for the production of such crop will be still available for the trees' use in Spring.

Pineapples and bananas should all be cleaned up, and the land got into first-class order. Pineapples, where at all liable to frost, should be covered with grass or other suitable material. The growth of weeds between the rows of pines on land liable to frost is one of the best ways of encouraging frost, as frost will strike dirty, weedy ground, and injure the pines growing thereon severely, when it will do little, if any, damage where the land is kept perfectly clean—another advantage of cleanliness in cultivation.

TROPICAL COAST DISTRICT.

Keep the land well cultivated—plough when necessary to bury weed growth, and get the surface of the ground into a state of thorough tilth, as moisture must be retained in the soil by cultivation to mature the spring crop of fruit. This applies not only to oranges and other tree fruits, but to bananas and pines as well. A good start in spring means good bunches of bananas and early ripening pineapples. Heavy pruning can be done now in the case of all trees not carrying a heavy crop of fruit, but where citrus trees are heavily loaded, the pruning should be put off till after the spring crop of fruit has been gathered. The spraying of the trunks and inside of the trees with the lime and sulphur wash can be carried out, and where Maori is making its appearance the suphide of soda wash should be used as well.

SOUTHERN AND CENTRAL TABLELANDS.

The pruning of all kinds of deciduous fruit trees is the chief work of the month in the Stanthorpe district. Do not be frightened to prune severely, first, in the case of young trees, so as to get strong well-grown trees instead of straggling top-heavy trees; and, second, in the case of trees that are going off in the size and quality of their fruit. Where peaches, apricots, plums, or

nectarines are only making very little new growth, and that weak, so that the fruit produced thereon is small, it is advisable to head the tree hard back, so that it will throw out some vigorous branches in Spring that will form a new head for the tree. Apples, as well as plums and apricots, are sometimes inclined to overproduce fruit spurs, which become long and straggling, and bear a large quantity of small-size fruit. A vigorous shortening back and cutting out of such spurs will have a very beneficial effect in the quality and size of the fruit produced.

Gather and burn all prunings; and, where codlin moth is present in the orchard, examine the tree carefully when pruning it, so as to see if there are any cracks, crevices, or masses of loose bark in or under which the larvæ of the moth may be hibernating. All larvæ so found should be destroyed, and if the work is carried out systematically it will tend to materially decrease the crop of moths that will hatch out the following spring.

As soon as any part of the orchard is pruned, gather up the prunings, and work the land, as a thorough winter weathering of the soil is very beneficial in its effects; and, further, it will tend to destroy many insects that may be wintering in it. The planting of new orchards or of trees to replace any that may have died, or that have been proved to be unsuitable to the district, may be continued during the month, and right on till the end of winter.

Do not prune vines in the Stanthorpe district, as it is advisable to leave the pruning as late as possible, but vine pruning can be done at any time now in the Roma or Central districts. Tree pruning can be continued during the month, and the orchard should be kept well worked. Citrus fruits can be marketed. Lemons should be gathered and cured.

Farm and Garden Notes for June.

FIELD.—Winter begins on the 24th of this month, and frosts will already have been experienced in some of the more exposed districts of the Southern coast and on the Darling Downs. Hence, insect pests will, to a great extent, cease from troubling, and weeds will also be no serious drawback to cultivation. The month of June is considered by the most successful lucerne-growers to be the best time to lay down this crop, as any weeds which may spring up in the event of a dropping season will be so slow-growing that the young lucerne plants will not be choked by them.

The land should now be got ready for millets, sorghums, panicum, &c. Oats, barley, vetches, clover, tobacco, buckwheat, field carrots, and Swedes may now be sown. Some advocate the sowing of early maize and potatoes during this month, but, obviously, this can only apply to the more tropical parts of Queensland. The land may be got ready, but in the Southern districts and on the tableland neither maize nor potatoes should be planted before August, or at the earliest, in warm, early districts, at the end of July. There is always almost a certainty of frosts, more or less severe, during these months. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn or in the open, if the weather be fine. In pitting them or storing them in hills lay them on a thick layer of sand, then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them. Then put down another layer of tubers, and repeat the process until the hill is of the requisite size. The sand excludes the air, and the potatoes will keep right through the winter. Late wheat may still be sown, but it is too late for a field crop of onions. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Cuttings of cinnamon and kola nut tree may be made, the cuttings being planted under bell glasses. Collect divi-divi pods and tobacco leaves. English potatoes may be planted. The opium poppy will now be blooming and forming capsules. Gather tilseed (sesame), and plant out young tobacco plants if the weather be suitable. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas. Fibre may be produced from the old stems. A hand machine for this purpose has just been introduced into Queensland from France, which will turn out 65 lb. of clean fibre in a day of 10 hours. The agent for the machine is Mr. A. Robinson, Civil Service Stores, Brisbane, and the price, we are informed, is £7 10s.

KITCHEN GARDEN.—Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted, also horse-radish can be set out now.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Land for early potatoes should now be got ready by well digging or ploughing.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

FLOWER GARDEN.—No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool moist spring time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses, and tie up, without pruning, to trellis or stakes, the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the summer bedding plants may be propagated.

Sow first lot, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground, but many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondii*, stocks, wallflower, and zinnias, &c., may be sown either in boxes or open beds; mignonette is best sown where it is intended to remain.

To grow these plants successfully, it is only necessary to thoroughly dig the ground over to a depth of not less than 12 in., and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should then be raked over smoothly, so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days, thin out so as to leave each plant (if in the border) at least 4 to 6 in. apart.

HIS LATE MAJESTY KING EDWARD VII. AND THE QUEEN CONSORT.

King Edward VII. was born at Buckingham Palace, 9th November, 1841, and was consequently nearly 69 years of age; married on 10th March, 1863, to Princess Alexandra, eldest daughter of the King of Denmark, and sister to the Empress of Russia and the King of Greece. Proclaimed King of Great Britain and Ireland and Emperor of India on 23rd January, 1901. Died 6th May, 1910.

EDWARD VII. AS AN AGRICULTURIST.

Not only has the British Empire to deplore the loss of the noblest, wisest, and most tactful King who ever sat on the British Throne, but the world of arts, science, and literature has lost a generous patron in the person of His late Majesty King Edward VII. In him also the agricultural world has to deplore the loss of one who, in the intervals of respite from State affairs, made rural pursuits one of his favourite occupations, and that not merely as a *dilettante*, but as an excellent and discriminating judge of whatever pertained to the garden and field, and especially to stock-breeding and dairy farming. To all of these pursuits by the personal interest he always took in them he extended the fullest encouragement by attending numerous agricultural shows, inspecting and keenly criticising the stock and other exhibits, exhibiting stock from his own herds and studs, content to take his chance of a prize with other less exalted competitors, and never feeling chagrined at his exhibit being placed below that of a rival, provided that the winner had shown something superior to the royal exhibit. We may here refer our readers to what we said concerning the royal farms and herds, in which Her late Majesty Queen Victoria took so active an interest, and to which King Edward devoted the same attention as did his Royal Mother, for he, as well as his royal consort, Queen Alexandra, was enthusiastic in the cause of stock-breeding and general agriculture, as is evidenced on the farm at Sandringham, so justly celebrated for the splendid stock bred there.

Agriculture.

POINTS ABOUT PLOUGHING.

Of late we have heard very little about ploughing-matches; whilst, a few years ago, a ploughing-match would attract farmers and ploughman from long distances from the scene of rivalry. No doubt modern methods have largely superseded those in general use in the young days of the older generation of farmers, many of whom we have known to carry off honours and prizes on the occasions of district matches. Still, although the good old-fashioned methods have passed out of date, the fundamental principles of preparing the land for a crop remain the same; and these are—That the furrow shall be straight; that the furrow slice shall be so turned over as to bury all weeds and rubbish, and leave as large a surface as possible exposed to the weather; also, that this surface shall be in such a state as to be capable of being harrowed down with as little labour as possible, without again exposing the buried rubbish. Furthermore, the act of ploughing should result in as little shine on the bottom of the furrow as can be avoided, so as to prevent the formation of a pan and to allow the capillary attraction between the furrow slice and the subsoil to establish itself as quickly as possible; and, last, but not least, that as much as possible should be done in a day.

Now, here are a few points about ploughing by a practical farmer and ploughman whose life-long experience is thought worthy of record in that excellent British journal, "The Farmer and Stockbreeder":—

THE OLD METHOD OF "LANDS."

At one time all the arable land used to be ploughed in "lands" from 3 to 9 or 10 yards wide, according to the heaviness of the soil. For purposes of surface drainage, the lands used to be ploughed "gee-again," time after time, until they were well rounded up, and there was very little soil left in the furrows, the idea being to grow a crop on the higher portion of the land, and use the furrows as ditches to carry off the water. Even thirty years ago, all but the very light soils was in "lands," and we used to plough them up and throw them down alternately, generally "landing up" for wheat. With the invention of machinery, these deep furrows became such a nuisance that much of the land was thrown into flats, and much of the strongest kind has gone down to pasture of sorts. For the benefit of beginners, I will describe—

PLOUGHING IN FLATS.

We will suppose that the land is to be in 12-yard pieces. A ridge is set out, and the piece ploughed "gee-again" until it is 12 yards wide; 24 yards from the first ridge a second is set out, and that piece also ploughed 12 yards wide. There is then a 12-yard piece of unploughed land between the two, and this is ploughed as a come-back piece, the finishing-off furrow being, of course, equidistant between the ridges; so that we have only one open furrow in 24 yards.

Some time ago I described the method of setting out a piece, and the care required at the land ends. The finishing off is a greater test of the ploughman's skill than any part of the work. If the pieces are of even width, the ploughman should measure when about 10 ft. wide, or he may be in mess at the finish, and have too much for one furrow and not enough for two. Suppose he is ploughing 9 in. wide, and finds that if he keeps on he will have 10 in. left for the last furrow, which would not do at all, as he

would leave an open furrow like a ditch; he must narrow his furrow half an inch. Suppose he measured when his piece was 82 in. wide, he could take off one furrow of nine, and then alter his plough half an inch. Two bouts at this would leave 30 in. Then he could narrow another half inch, and take off eight on each side, leaving 14 in., which he would split, turning seven on each side. A furrow so finished and properly scoured out will harrow down almost level, and offer no serious obstruction to the binder.

SCOURING

is merely ploughing a miniature furrow in the open furrow itself, care being taken not to go too deep to fetch up too much subsoil. In single-scouring the plough is run up the middle, so as to pack a small furrow on to the last surface furrow. In double-scouring, the plough is run well to the left-hand side of the open furrow, so as not to throw the soil so far, and in coming back this is turned again, bringing up 2 in. more underneath it. This makes a very neat job, and such finished furrows harrow down best of all.

When the one side of a field is much longer than the other, the triangular piece left after all the straight pieces are ploughed is best set out in equal widths, the turning to be done on the third or side headland, the horses ploughing out the longest side and walking empty along the headland to reach the short side of the piece; but, if there is only one strip left—say, 16 yards wide at one end, and tapering to nothing at the other, possibly 150 yards distant—this plan involves great waste of time. The piece is often ploughed in what we call a "pike." In this case a number of short turns have to be made. If it is a "come-back" piece, the short turns should be made when the narrow end is about 10 yards wide, until the whole piece is 10 yards wide, when it is finished off straight through. If it is a "gee-again" piece, the short turns should be made as soon as the ridge is six furrows wide, so as to avoid trampling the land more than is absolutely necessary. Lastly, the headlands have to be ploughed in the same way as the rest of the field. Any one who likes to see his farm neat has the corners dug and sown after the drilling is done, and this certainly helps to keep the corners clean instead of allowing them to be beds of couch and dock.

TRAINING THE TEAM.

When land is ploughed with three horses in file, a boy is usually sent to drive, and, unless he is an exceptional one, he will spoil the best team on earth. If he is only strong enough to turn the plough, it is better for the ploughman to drive the horses out at the end and get them into good habits, even if he has to take the plough from the boy to set it in. It is marvellous what sagacity the fore-horses show if they have been driven well, and half-breds learn more quickly than cart horses. In training a fore-horse, it is advisable never to whip him for doing wrong, or he will put his head in the air and run away from anyone trying to take hold of his rein. If he makes a mistake the team should be stopped, and he should be quietly led into his right place and shown his error. A well-trained fore-horse makes a great difference to one's comfort. Some boys get into a way of talking to the horses in a continuous sing-song, until, as old Chaucer says, "their ears acken of his draughty speech." A sharp word if they are going too slowly is quite enough. If one only talks to a horse when something is wanted, he pays attention. When a boy I trained one until I could drive him to an inch by the voice. I often went to plough without a driver, and with reins on the last horse I had no trouble at all until the 3 o'clock express went by. After that old Captain would do no more, but simply act the fool at every end.

This is the proper way to drive out a single team. There is often a young raw horse in the middle, and, as all horses are inclined to slink off round the headland as soon as they are out of the furrow end, the middle

horse is led up and touched with the whip if necessary, the fore-horse being called meantime, and not allowed to turn until he touches the hedge. The driver takes the middle horse up sharply, and then stands and holds his hand for the last to come up to. If he turns lazy, he is led out for a few times with a sharp reminder from the whip. I would always flog a thiller horse every time he had to be led out. Another trick many thillers get is to slack the chains, and let the middle horse take the plough up. This he is entitled to if he takes up the running at the right moment. But some get a very bad habit of stopping dead, and letting the middle horse almost pull its collar and saddle off. No doubt this is to cool the back and shoulders for a second, but it is very annoying, and makes a mess of the work, as he then goes out at a gallop, and not always in a true line.

The way to cure him is to creep quietly behind him toward the land end, and punish him severely for a few times. A good driver will permit no slackness. The way to have a good team is to correct every little fault at once, and praise and pat them when they do right. I had one waggoner who trained his pair until he could plough without reins, and his horses would walk to a stick with a white paper on as straight as they could be led. I lay stress upon this, because really good ploughing cannot be done without a docile, tractable team.

JUDGING PLOUGHING.

In judging ploughing I have found twenty-four points a good scale to work from—six given for the ridge, a maximum of three for straightness and three for well closing; six for finishing, two of which are for straightness and four for style and narrowness of open furrow; twelve for general excellence of work, such as edge on the furrows, closing and pressing up, clean land ends, and freedom from baulks; and when there is a tie give one extra for general good work, for, after all, that is the best ploughing which is easiest converted into a good seed bed. I certainly think that the judges should be in the field the whole day. When one has fifty or sixty ploughs in one field, there is quite enough to do for some hours. I always walk across between the first and second bout and see the ridges open; then again as soon as possible after closing from the other end of the field, a third and fourth time during the work, and once after the finish. Not until then do I count up the marks. If a man makes a crooked ridge and quickly retrieves it, I do not penalise him so much as if he fails to correct it until half his piece is done. I do not take much notice of time, so long as they finish in the time allowed, as this depends upon the team provided by the master quite as much as upon the skill of the man.

Where the soil varies in a field, the judge should always take note and make allowances. Ploughing-matches have done much good in the districts where I have been judging year after year, and anything which promotes friendly rivalry amongst the men is to be encouraged. But if you want to make a good ploughman you must catch him young. I have had boys who were very fair hands with a plough at the age at which they now leave school. We should not begrudge the money for their education if it made them better fitted for the life that most of them must lead; but, alas! it does not.

SOME METHODS FOR THE DESTRUCTION OF NOXIOUS INSECTS AND RATS.

(Translated from "l'Agronome Tropicale," Brussels.)

Destruction of Underground Insects.—Phytophogic insects which live underground are principally destroyed by volatile or decomposable insecticides injected into the soil, through which they diffuse their toxic gases. As a rule, bi-sulphide of carbon is used with this object in view. Its action is very energetic, but its use is attended with some drawbacks. It has a toxic effect

on vegetable life, it arrests the fermentations of the soil, and its odour puts animals to flight, with the result that it allows those which succeed in escaping, to get to the surface and thus avoid destruction.

M. Th. Mamelle has lately recommended, in a communication to the Academy of Sciences of France, the employment, for the above purpose, of cyanide of potassium, which has none of the objectionable properties of bi-sulphide, and which is yet equally effective. Cyanide of potassium, injected into the soil in the form of an aqueous solution, undergoes therein a process of decomposition, arising either from the action of carbon anhydride or from that of calcium bi-carbonate, which, by balanced reactions, displace gradually the salt of the cyanhydric acid. The gas thus liberated diffuses itself through the soil, and its presence is known by the destruction of all the animal life within its influence.

The cyanide is applied by means of an injector similar to that used in agriculture. The soil receives several blows from the injector (6 to 15 to the square metre—10 sq. ft.—according to its permeability), driven to a depth of 10 to 20 centimetres (about 3 to 7 in.), and at each blow 8 to 10 cubic centimetres of a solution of cyanide of potassium of 200 grammes (6¼ oz. Troy) to about 2 pints of water is injected, or an average of 1·5 (15½ gr.) to 2 grammes (30 gr.) of the salt at each stroke of the injector, or 15 to 20 grammes (225 to 300 gr. Troy) on an average per square metre (about 10 sq. ft.).

The following are some of the advantages of using cyanide of potassium as against bi-sulphide of carbon:—

1. The action of the chemical is slower, only manifesting itself after several days. The animals do not escape, and are found dead on the spot.
2. Plants in full vigour do not suffer from this treatment, even if the cyanide is used in very strong doses.
3. The fermentations of the soil do not appear to be arrested.

Destruction of Field Rats.—The use of bi-sulphide of carbon is, it appears, efficacious in the destruction of field rats. M. de Kruyff, Chief of the Division in the Department of Agriculture, Netherlands India, who has experimented with it, has obtained positive and immediate results at a minimum of expenditure. His method is as follows:—Twenty-four hours before the operation, the natives stop up the openings of the rat holes with some earth, and this has the effect of revealing those which are inhabited, because on the following day the stopped-up holes will be found to have been reopened. Into each of these is poured a dose of from 1 to 2 cubic centimetres of bi-sulphide of carbon; then, after the lapse of a few seconds, when the liquid has evaporated, a light is put to the hole, upon which a slight explosion occurs, which fills the rat runs with poisonous gas.

All the rats are instantly destroyed; 1 kilogramme (2⅕) lb., costing 1 franc (10d.), is sufficient to deal with about 500 holes.

M. de Kruyff has operated in this manner on 2,772 holes; of these, 42 were opened up after treatment, and 131 dead rats were found—an average of 3 per hole. In two cases 10 carcasses were found in a single hole.

Destruction of Rats in the Federated Malay States.—A somewhat similar process has been adopted in those States for the destruction of rats in rice fields. According to M. De Wildman, the damage caused in the rice fields there by rats incited the Department of Agriculture to seek for some means of getting rid of the depredators. Experiments made by the Government Mycologist, Mr. W. S. Coallagher, showed that the best results were obtained by the use of bi-sulphide of carbon in the following manner:—Between 10 a.m. and 4 p.m. is the time for the work, which requires the services of three men. One is in charge of the bottle containing the liquid, the second applies the tow or kapok to the holes, and the third man closes them. The tow is

soaked with liquid, which runs down a tube provided with a tap. The hole through which the rat could escape having been found, the tow is at once pushed into it a little distance with a stick, and the hole is then closed with earth. The fumes of the bi-sulphide act promptly, but care must be taken that all the holes leading to the nest are closed, in order to make the fumes effective.

Destruction of White Ants.—White ants attack rubber-trees. The only practical method for their destruction is to reach their nest, which is hidden beneath the soil, and whence little galleries or tunnels radiate in several directions, by which the ants reach the trees attacked. The "Journal d'Agriculture Tropicale" describes a curious method of destroying white ants by means of the telephone. The inventors have advertised a product which is no doubt anhydride sulphuric acid; and a German firm invites the attention of planters to an apparatus lately constructed by them, the action of which is analogous to that of the producer of arsenious acid, as previously described.

The apparatus consists of a furnace in which is burnt some complex product which gives rise to vapour of sulphuric acid, which is driven into the nests by a pump or fan. The writer of the article says he has not the necessary data to enable him to determine to which of the two products preference should be given, but we particularly mention the apparatus because it is rendered effective by a regular telephone, consisting of a microphone attached to the upper part of a steel tube, which is driven into the ground, and, it appears, reveals the locality of the white ants' nests at a distance of as much as 5 or 6 metres (about 16 to 19 ft.).

PRESERVATION OF CORN.

By H. C. QUODLING, Acting Principal, Queensland Agricultural College.

1.—Grain kept for any length of time in an hermetically sealed tank loses its vitality, but is good for feed purposes.

2.—Before putting grain away in tanks or other places, it must be perfectly dry.

3.—Bisulphide of carbon at 1s. per lb. and naphthaline at 9d. per lb. are two substances used for keeping weevil and moth from grain; the former is very volatile and inflammable, and should never be used by a person when smoking or where there is a light. It has this advantage: That it leaves no trace of any odour after use and exposure of grain to the air. The odour of naphthaline is more difficult to get rid of, after it has had time to permeate grain in a tank.

4.—Bisulphide is more adapted for use with grain in closed vessels; while the naphthaline is more lasting in its effect if used in heaps of maize cobs or grain of any kind that is not in vessels.

5.—To use the bisulphide: Procure 4 oz. for each 400-gallon tank, and place in handy bottle. Pass a piece of strong cord through the cork of the bottle, taking care that there is a knot tied to prevent it slipping out again; putty up the hole from top side after replacing the cork. Allow enough cord (about 5 ft.) to reach out of the tank.

Bore a hole in a piece of wood to admit of letting the neck of the bottle into it, but not large enough to let the shoulder of the bottle through.

Place the latter fixed into the wood on the bottom of the tank, and fill in the grain.

Have the lid and putty ready before pulling the cork out of the bottle.

Place the lid on quickly and putty up, making the tank airtight and watertight.

Another method of applying bisulphide is to insert a stout length of bamboo vertically in the tank, which had previously been perforated with gimlet-holes; fill in the grain. Wind some cotton waste round a stick evenly.

Pour the bisulphide on when all is ready and insert into the bamboo; then plug up the top with cotton waste, cover, and seal the tank.

6.—For applying "naphthaline," use perforated bamboo—1 lb. for a 400-gallon tank. Insert a 4-oz. dose in the bottom of the bamboo; follow with a plug of cloth or cotton waste and continue the process, finishing off with a tight plug at the top.

Heaps of maize or other grain may be treated in a similar manner; but for big heaps use a horizontal bamboo in every layer of 18 in.; but in this case bore auger-holes in the side of the bamboo at every foot. Thin bagging can be placed over the holes or around the bamboo.

Of the two processes, "naphthaline" may roughly be termed a preventive; while "bisulphide of carbon" is more of a cure, and is a sure means of destroying any weevil or moth present.

To assist in retaining the vitality of the grain placed in the tanks, it is necessary to open them up periodically and move the grain about as much as possible. By testing a sample of the grain with damp flannel at each time of opening, the germinating power of the seed may be watched.

STORING MAIZE.

There is one possible method which an American farmer some ten years ago discovered accidentally, and which he declared to afford absolute immunity against the weevil. One year he sacked up a lot of cow-peas, and one fourth of the sacks used were salt sacks, with the salt still clinging to them. When he marketed the peas he found those in the salt sacks were in perfect condition, whilst those in the other sacks were almost destroyed by weevil. It has been suggested that maize might be stored unhusked, but it is in the husk that a great many weevils secrete themselves and afterwards destroy quantities of the grain. This farmer, knowing this, dissolved a quart of salt in 2 gallons of water, and, as the unhusked cobs were thrown into the barn, he gave each layer a slight sprinkling of the salt solution. There was not the slightest damage from the weevil, and he has, he says, used the salt remedy ever since with perfect success. This is such a very easy remedy that Queensland farmers might take the trouble to make an experiment and find out for themselves the correctness or otherwise of the statement.

I think weevil in corn may be greatly lessened if not entirely prevented by gathering the corn with the entire husk on it, and storing in the coolest place possible, with plenty of ventilation under it—that is, the floor to be well up off the ground, say 12 or 15 in. Where the farmer has a large hay-shed he might build a corn-crib inside this shed, of thick slabs and covered with boards or bark; with ventilation over the corn, I believe the trouble from weevil would be but small, if any.

At the State Farm at Texas, where we had very cool wooden buildings, we kept corn for eighteen months without a sign of weevil. We husked and shelled the corn as sold or fed. Care should be taken that the corn is well matured and thoroughly dry before storing.

SILOS FOR FARMERS.

With the object of meeting the views of farmers who are desirous of erecting reinforced concrete silos, the Department of Agriculture and Stock has had the necessary moulds prepared for use in the erection of 108 and 61 ton silos. These moulds will be lent to any farmer who wishes to erect a silo, whenever they are available, upon conditions that proper care is given, and that the railway freight on the moulds is paid. Instruction in the method of constructing the silo will also be given free of charge by an officer of the Department.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF APRIL, 1910.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Lubra ...	Grade Jersey ...	19 Mar., 1910	723	4·5	36·52	
Carrie ...	Jersey	26 Feb. ,,	616	4·6	33·33	
Linda ...	Ayrshire	10 Apr., 1909	603	4·2	28·37	
Orange ...	Guernsey-Shorth'n	13 Dec. ,,	557	4·5	28·16	
Gem ...	Shorthorn ...	22 Jan., 1910	587	4·2	27·60	
Lerida ...	Ayrshire	26 Jan. ,,	623	3·7	25·60	
Lady Sue ...	Grade Holstein ...	4 Apr. ,,	597	3·8	25·27	
No. 112 ...	Grade Jersey ..	25 Dec. ,,	545	4·0	24·32	
Laura ...	Ayrshire	16 Oct., 1909	555	3·9	24·14	
Cocoa ...	Jersey	12 Sept. ,,	395	4·5	22·97	
Daisy ...	Holstein	29 Dec. ,,	587	3·5	22·78	
Nita ...	Grade Shorthorn	24 Jan., 1910	537	3·8	22·64	
Patch ...	Guernsey-Shorth'n	29 Nov., 1909	541	3·6	21·64	
Conceit ...	Ayrshire	22 Nov. ,,	521	3·7	21·44	
Bluebell ...	Jersey	29 Jan., 1910	515	3·7	21·19	
Dot ...	Shorthorn... ...	1 Nov., 1909	500	3·8	21·17	
Bangle ...	,, ...	26 Dec. ,,	456	4·1	20·91	
Poppy ...	Grade Guernsey ...	6 Feb., 1910	455	4·1	20·86	
Whitefoot ...	Holstein-Devon ...	2 Oct., 1909	521	3·6	20·84	
Comet ...	Grade Holstein ...	4 Nov. ,,	504	3·7	20·74	
Rosalie ...	Ayrshire	3 Jan., 1910	495	3·7	20·17	
Careless ...	Jersey	27 Sept., 1909	396	4·5	20·02	
Ethel ...	Holstein-Shorth'n	9 Oct. ,,	486	3·7	20·00	
Lady Kelso	Shorthorn ...	2 Oct. ,,	445	4·0	19·88	
Night ...	Grade Holstein ...	23 Sept. ,,	476	3·7	19·59	
Maud II. ...	Shorthorn ...	18 Dec. ,,	455	3·7	18·72	
Vixen ...	,, ...	28 Dec. ,,	451	3·7	18·56	
Dewdrop ...	,, ...	1 Nov. ,,	491	3·4	18·46	

Grazed on natural pasture only which has considerably deteriorated.

RATIONS FOR PIGS.

In the United States, Denmark, and Germany, the rations for pigs given below have been found valuable and practical:—

UNITED STATES.

For pigs of 20-60 lb.—(1) ¾-lb. maize meal per gallon of skim milk; (2) a mixture of one-third maize meal, one-third bran, and one-third gluten meal, with skim milk at disposal.

For pigs of 60-100 lb.—(3) 1½ lb. maize meal per gallon of skim milk; (4) a mixture of half maize meal, one-quarter bran, and one-quarter gluten meal, with skim milk at disposal.

For pigs of 100-180 lb.—(5) 2 lb. maize meal per gallon of skim milk; (6) a mixture of two-thirds maize meal, one-sixth bran, and one-sixth gluten meal, with skim milk at disposal.

For pigs 2-6 months old—(7) maize meal, 3-5 lb. per head per day, with lucerne forage or pasture.

Denmark.

1. Shorts, 2 parts; ground barley, 2 parts; maize meal, 1 part; skim milk.

2. Ground barley, 2 parts; wheat bran, 1 part; ground rye, 1 part; skim milk.

3. Ground barley, 2 parts; ground oats, 1 part; maize meal, 1 part; skim milk.

Germany.

1. Ground barley, 1 part; ground rye, 1 part; maize meal, 1 part.

2. Ground barley, 2 parts; ground wheat, 1 part; ground rye, 1 part.

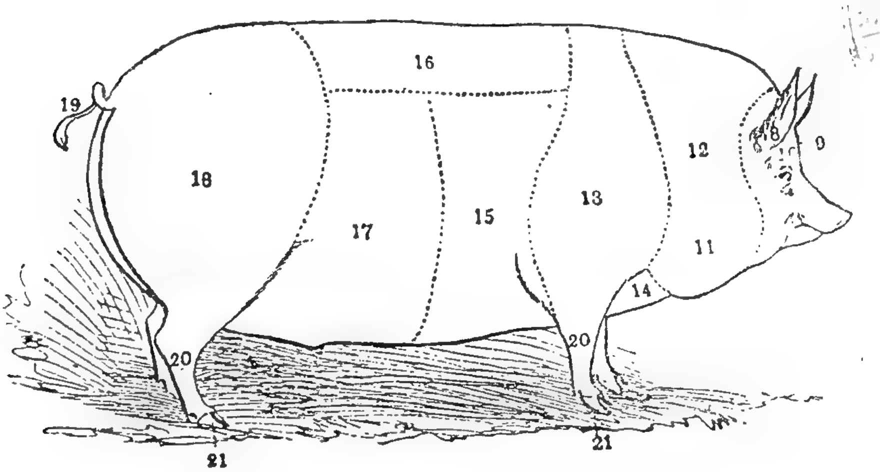
3. Ground barley, 1 part; maize meal, 1 part; cooked potatoes and a little skim milk towards the end of fattening.

POINTS OF A BACON PIG.

By P. R. GORDON.

It is almost needless to say that the diagram which accompanies this paper is copied from one illustrating one of the late Mr. A. Bruce's many contributions on point-judging. Points 1 to 7, inclusive, cannot be illustrated by diagram.

1. *Points of a Bacon Boar Pig.*



Description of Points and their Values.

1. "Pedigree."—Purity of breeding, as shown by certificates or owners' declarations—8 points.

2. "Offspring."—Success of offspring at shows, to be proved as above—8 points.

3. "Style and Character."—Display, purity of breeding, and general excellence—4 points.

4. "Size."—A good length from head to tail, and the live weight at eighteen months should be from 300 to 400 lb.—5 points.

5. "Colour."—According to breed—2 points.

6. "Hair."—Abundance of smooth, and evenly set in—2 points.

7. "Skin."—Of medium thickness, soft and elastic to the touch—2 points.

8. "Ear."—Rather small, thin, and tolerably erect, not objectionable if it droops slightly forward—2 points.

9. "Head, &c."—Head short and broad between the eyes, nose short, cheeks full—4 points.

10. "Eye and Expression."—Not too small, open and mild, disposition quiet and contented—3 points.

11. "Jowl."—Heavy—2 points.

12. "Neck."—Thick and short, and running evenly into the shoulder and back—4 points.

13. "Shoulder."—Not large, yet sufficiently so to be symmetrical—4 points.

14. "Breast and Brisket."—Broad and well let down to the knee—3 points.

15. "Chest and Fore Ribs."—Deep and rather barrel-shaped—7 points.

16. "Back and Loins."—Broad and slightly curved or arched from shoulder to setting-on of tail—12 points.

17. "Back Ribs, Flank, and Belly."—Back ribs well sprung and deep, underlines straight from brisket to and including flank—6 points.

18. "Hams and Rump."—Long from the back to the setting-on of the tail, and broad and full—13 points.

19. "Tail."—Long, and tuft of long hair at tip—1 point.

20. "Legs."—Perfectly straight, bone fine, meat down to knee and hock—6 points.

21. "Feet."—Short and small, set well under the body, yet wide apart—2 points.

Summary of Above.

	Points.
Pedigree and offspring, Nos. 1 and 2	16
Style and character, No. 3	4
Size, No. 4	5
Quality, Nos. 5 to 10	15
Forequarter, Nos. 11 to 15	20
Middle, Nos. 16 and 17	18
Hindquarter, Nos. 18 and 19	14
Legs, &c., Nos. 20 and 21	8
Aggregate	100

In this scale I have followed Mr. Bruce throughout, although, it should be stated, the values given to the various points are suggestive rather than arbitrary.

A NEW FEED-BAG.

A feed-bag for horses has been devised by a Berlin policeman to replace the ordinary nose-bag now generally in use. This new arrangement is attached to the shafts of the vehicle by means of two iron rods bent at the proper angle, and the horse can eat his oats or other grain without having to put his head down to the ground. Some horses continually throw their oats out by shaking their heads, but the new scheme will prevent that.

The Horse.

THE SUFFOLK STALLION FOR CROSS-BREEDING.

A correspondent of the "Nor' West Farmer," Canada, writes concerning the Suffolk stallion:—

"I do not think there is a better heavy horse than the Suffolk in the world for crossing on all types of mares. To-day we find the leading breeders in England and Ireland crossing their purebred Shires, Clydes, Hackneys, and thoroughbred mares with Suffolk stallions. The same Suffolk stallions have travelled the same districts in Ireland for sixteen years and others over ten years. This illustrates that the cross is all right, as otherwise I doubt very much whether a stallion could travel one season, let alone sixteen, in a country like Ireland, which is noted for its horsemen. The Irish breeders say, 'The use of the Suffolk horse with the small light mares of the south of Ireland has been found to impart strength and substance to their progeny, without impairing their powers of endurance and tough constitutions. The results of this cross are kind workers equal to a ton weight in draught on country roads, and can trot 10 miles an hour in harness.' For a second cross I would recommend a Suffolk for the heavy fillies, any that had a dash of thoroughbred on their dam's side. I would breed back to a good thoroughbred, and thus follow the example of the Irish and Australian breeders, who have proved beyond a doubt that this second cross produces more heavy-weight-carrying hunters than any other combination.

"As regards weight of stallion for this class of mares, I would advise one of the lighter ones, say between 1,700 lb. and 1,800 lb."

Times of Sunrise and Sunset at Brisbane, 1910.

Date.	May.		June.		July.		August.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·30	5·0	6·39	5·4	6·30	5·18
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·31	5·0	6·39	5·4	6·28	5·19
5	6·15	5·13	6·32	5·0	6·39	5·5	6·28	5·20
6	6·16	5·13	6·32	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·6	6·26	5·21
8	6·17	5·11	6·33	5·0	6·39	5 6	6·26	5·22
9	3·17	5·11	6·34	5·0	6·39	5 6	6 25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·34	4·59	6·39	3 7	6·23	5·23
12	6·19	5·9	6·35	4·59	6·39	5·8	6·22	5·24
13	6·20	5·8	6 35	4·59	6·38	5·8	6·22	5·24
14	6·20	5·8	6·36	4·59	6·38	5·9	6·21	5·25
15	6·21	5·7	6·36	4·59	6·38	5·9	6·20	5·25
16	6 21	5·6	6·36	5·0	6·38	5·10	6·19	5·26
17	6 22	5·6	6·37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·5	6 37	5·0	6·37	5·11	6 17	5·27
19	6·23	5·5	6·37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6·37	5·0	6·36	5·12	6·15	5·28
21	6·24	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·25	5·3	6·38	5·1	6·36	5·13	6·14	5·29
23	6·25	5·3	6·38	5·1	6·35	5·13	6·13	5·29
24	6·26	5·3	6 38	5·1	6·35	5·14	6·12	5·30
25	6·26	5·2	6·39	5·1	6·34	5·14	6·11	5·30
26	6·27	5·2	6·39	5·2	6·34	5·15	6 10	5·31
27	6·27	5·2	6·39	5·2	6·33	5·15	6·9	5·31
28	6·28	5·1	6 39	5 2	6·33	5·16	6 8	5 31
29	6·28	5·1	6·39	5 2	6·32	5·16	6·7	5·32
30	6·29	5·1	6 39	5·3	6·32	5·17	6·5	5 32
31	6 29	5·0	...	...	6·31	5·17	6·4	5·33

PHASES OF THE MOON.

			H. M.
2 May	☽	Last Quarter	11 30 p.m.
9 „	●	New Moon	3 33 „
16 „	☾	First Quarter	0 13 „
24 „	○	Full Moon	3 39 „
1 June	☽	Last Quarter	8 25 a.m.
7 „	●	New Moon	11 16 p.m.
15 „	☾	First Quarter	2 19 a.m.
23 „	○	Full Moon	6 12 „
30 „	☽	Last Quarter	2 39 p.m.
7 July	●	New Moon	7 20 a.m.
14 „	☾	First Quarter	6 24 p.m.
22 „	○	Full Moon	6 37 „
29 „	☽	Last Quarter	7 35 „
5 Aug.	●	New Moon	4 37 p.m.
13 „	☾	First Quarter	0 1 „
21 „	○	Full Moon	5 14 a.m.
28 „	☽	Last Quarter	0 33 „

Poultry.

REPORT ON EGG-LAYING COMPETITION, Q.A. COLLEGE, APRIL, 1910.

Our seventh egg-laying competition commenced on 1st April, with 25 pens, including one of W. Orpingtons, two B. Leghorns, two S.L. Wyandottes, and twenty pens of W. Leghorns. The birds belonging to R. Burns (two pens), E. A. Smith (two pens), Mrs. Craig, C. Miller, Cowan Bros., E. Debus, Mrs. McKay, and Mrs. Peddle (W. Orpingtons) were all sent too young; while the entries of Yangarella, G. W. Hines, J. F. Dalrymple, ad E. Sharpe broke out with warts a few days after arrival. Fortunately, the trouble did not spread, as all houses were at once sprayed with a strong solution of Little's sheep dip. J. Gosley's birds were in moult when they arrived. Considering everything, we have made a fairly good start. R. T. Porter's W. Leghorns (No. 1) win the monthly prize of 10s. The following are the individual records:—

	April.
R. T. Porter, Redbank—W. Leghorns (No. 1)	104
Range Poultry Farm, Toowoomba—W. Leghorns... ...	95
A. H. Padman, Adelaide, S.A.—W. Leghorns	92
J. Green, Warwick—S.L. Wyandottes	86
Mrs. Kinnear, Hyde Park, S.A.—W. Leghorns	72
R. T. Porter, Redbank—W. Leghorns (No. 2)	68
E. A. Smith, Paddington, Brisbane—W. Leghorns (No. 2)	65
J. F. Dalrymple, Bexley, N.S.W.—W. Leghorns	61
Mrs. Peddle, Wakemore P. Farm, Laidley—W. Leghorns	59
E. A. Smith, Paddington, Brisbane—W. Leghorns (No. 1)	54
R. Burns, Warwick—W. Leghorns	41
Yangarella P. Farm, Indooroopilly—W. Leghorns ...	40
W. D. MacPherson, Warwick—W. Leghorns	33
S. Holmes, Toowoomba—W. Leghorns	29
Alex. Smith, Goodna—W. Leghorns	25
Mrs. Peddle, Wakemore, Laidley—W. Orpingtons ...	23
J. Gosley, Childers—W. Leghorns	18
C. W. Hines, Mutdapilly, Harrisville—W. Leghorns ...	17
Cowen Bros., Burwood, N.S.W.—W. Leghorns	15
S. E. Sharpe, Childers—W. Leghorns	14
Mrs. McKay, College Road, Gatton—B. Leghorns... ...	8
Geo. Miller, Gatton—B. Leghorns	6
E. Debus, Enfield, N.S.W.—W. Leghorns	5
Mrs. Craig, Miriam Vale—W. Leghorns	4
R. Burns, Warwick—S.L. Wyandottes	0
Total	1,034

P. M. PITT, for Acting Principal.

KILLING FOWLS.

The most common methods—namely, screwing the neck and chopping off the head—may be looked upon as at least humane; but one method we have seen practised in Germany is sticking the fowls in the head or throat. Concerning this style of killing poultry, Ernest Cobb, in the "Feathered World," says:—

We have been told that there are some who can perform the operation very easily and quickly, but we never saw it so performed; and if there is such a man in existence, we deplore the fact when we think of the numbers of poor helpless creatures he must have made suffer before he became *au fait* at the game. In practice, it will be found that the first thrust into the roof of the mouth was not quite correctly made, and a second has to be made, and

even then the blood does not seem to flow very quickly, and a third attempt is made, with, perhaps, no better results. All this time the poor bird is suffering agonies, and eventually its sufferings are put an end to by decapitation.

Now, if an incision is made in a fowl, it will not keep nearly so long as if sent to market intact. If the bird is required for home consumption, a bled fowl will eat dry, and not one-quarter so juicy or so well flavoured generally as one that has not been bled. The proper method is as follows:—

The operator, whilst sitting down, takes the legs in the left hand, the front part of the bird's breast lying against his thigh. The right hand is now passed under the shoulders of the wings—the thumb on one side, the fingers on the other (Fig. 1). He now forces the wings backwards, closing his hand

FIG. 1.

FIG. 2.

at the same time. Then with the left hand he seizes the legs, tail, and ends of wings in one firm grasp (Fig. 2). His right hand being now at liberty, he passes either the first or second finger over one side of the neck and the remainder on the other, seizes the head in his hand, and lets the fork of his fingers come just behind the back of the head where it joins the neck. He then places the body of the bird so that the left hand is held firmly against his left thigh, and the head of the bird just over his right thigh near to the knee. He now sharply bends the head backwards, and at the same time somewhat separates his knees, and all is over. From 5 to 10 seconds are sufficient to perform the whole operation.

Now, a word about

PLUCKING.

Directly the neck of the fowl is broken, commence plucking off the feathers with the right hand, whilst still holding the legs, tail, and wings in the left one, in order to prevent the bird from flapping its wings about. There is no cruelty about this, for surgeons are unanimously of opinion that when once the spinal cord is broken there is no further feeling in the body. The disconnection of the body from the brain prevents any feeling in the former. The head is now simply hanging on to the body by the skin of the neck, the end of the neck being one or two inches away from the head. The reason for commencing the plucking as soon as the bird is killed is that the feathers come away ten times easier directly after killing than if the bird is left alone for one minute only before starting to pluck.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1909.									1910.			
	April.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.
North.													
Bowen	1·15	2 32	1 98	1·23	0·13	0·21	0 36	3·15	19 98	15 45	7·10	21·45	5·26
Cairns	14 19	1·06	2 48	0 65	2·48	0·7	3·19	7·31	15 24	21 80	17·13	24·16	16·13
Geraldton	28 51	5·98	9·13	6 53	5·32	0·36	6·71	14·57	19·98	20 35	34·57	33 74	24 57
Gindie State Farm ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Herberton	0·70	0·81	1·22	0·20	0·75	0·50	2·39	4·50	5·11	16·64	12 21	12·40	3·50
Hughenden ..	...	Nil	1·71	1·37	0·33	0·8	1·95	0·54	8·01	4·52	3·59	2 95	0·30
Kamerunga State Nurs.	4·95	0 97	...	...	...	...	...	...	...	...	...	...	...
Mackay	2 59	2·33	2·05	4·00	0·75	0·73	2·88	3·18	25 56	35·28	9 73	24·31	6·18
Rockhampton	1·21	0 03	1·33	2·99	1·37	1·20	2·16	4·55	2·74	11·93	1·28	19 84	0·61
Townsville	1·28	1 07	1·51	0 83	0·57	0·12	2·07	1·31	11 51	23 07	10 85	17·21	2 29
South.													
Biggenden State Farm	2·00	0·72	2 60	4·01	1·78	0·29	...	2 83	6·96	7·22	3·99	3·82	0·73
Brisbane	4 67	0·82	1 75	2·19	2·44	2·74	1·56	4·14	6 45	7·24	4 19	6 42	1·22
Bundaberg	1·54	0 67	1 51	5 65	1·66	0 98	0 42	3·55	2 99	11 81	2·43	8·92	0 31
Dalby	1·60	Nil	1 87	1·19	3 13	0·47	1·02	2·13	2·45	10 88	1·33	3 87	Nil
Esk	5·03	0·36	2·43	2·74	3 31	2 60	2 61	2 69	9·20	8 60	1·94	6·19	1·19
Gatton Agric. College	3 82	0 32	1·22	2·02	2·09	2·29	1 87		3 92	11 79	...	3·66	0·69
Gympie	2·34	1 15	2 96	4·70	2·80	1·70	2 30	3·82	16 54	5·92	3·48	7 74	1·13
Ipswich	4·56	0 05	1 31	1·67	1·34	3·55	1·93	1·56	4·72	6 91	2·78	3·56	1 65
Maryborough	2·4	0 91	2·57	5·02	2 53	1·56	0·51	3.94	6 83	5·65	2 99	3 92	1 72
Roma	1 91	0 44	2·73	1·54	4 83	0 12	0 90	2·12	1·05	4·74	1·47	8·36	0 15
Roma State Farm ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tewantin	9 37	1·00	3·24	4 08	4·24	1·38	3·82	1·90	8 85	5·96	3 42	15·18	6·30
Warwick ..	2·21	0·70	1·23	2·04	2 28	1 77	2 85	2 77	4·25	3·93	3·14	2·57	0 68
Wellington Point ...	...	...	...	...	...	...	...	...	9·00	...	...	...	...
Westbrook State Farm	...	...	...	...	...	...	...	...	...	...	...	...	...
Yandina	5·25	1·10	2 70	3·70	5·81	3·84	2·30	0 76	20·18	6·71	2 07	11·81	3 23

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

Horticulture

COAL ASHES FOR TOMATOES.

Whilst it is generally conceded that coal ashes are deficient in manurial constituents, at least of ammonia, and have little value as plant food, still, as analysis has shown that they contain carbon, silica, alumin, sulphate of lime, iron, potash, carbonate of lime, and oxide of iron, they are said to be a good manure for grass, peas, and potatoes. The assimilation of some of these constituents has certainly been proved in the case of tomatoes, and their beneficial effect on this fruit has frequently been demonstrated in a marked degree. Some years ago we noticed in one of the suburban gardens near Brisbane a tomato bush with vines 14 ft. long trained to a fence. On the manured land inside the fence none of the plants grew higher than 4 or 5 ft. On examining the spot where the larger plant grew, we found that the soil consisted of old bricks, broken asphalt, and lumps of coal ash and charcoal. The vines were laden with clean, healthy, large-sized fruit; whilst much of the fruit on the others was badly affected. Another case mentioned in this journal came under our notice at Mount Hogan, in the Gilbert district. This mining township had been for some time abandoned. On looking over the crushing machine site, we found some immense tomatoes, quite ripe and healthy, growing on plants which had sprung from the old engine-house ash-heap. There was not a particle of soil in the heap.

In another case an old brick pit full of coal ashes was planted with tomatoes, a little cow manure being placed under each plant. The result was a heavy crop of fruit of fine size and quality. Some of the plants extended to 18 ft. in length, growing year after year in the same ashes. Moreover, the "spot" disease never appeared.

The Perth (W.A.) "Farmer" now corroborates the above experience as to the value of coal-ashes, publishing a communication from a correspondent in the "Rural New Yorker" to the following effect:—

Coal ashes have always been something of a puzzle to me, for analysis shows that they have little value in plant food, and yet at times there are results from them that puzzle one. Years ago, in cleaning up a large accumulation of coal ashes, I had them carted and spread on a grazing paddock, arguing that they would probably do no harm if no good. The growth of white clover as far as those ashes went was something wonderful, as compared with the land around. It was a compact and moist clay soil, and I suppose the absorption of moisture favoured the clover. On another occasion I had a pile of coal-ashes in an out-of-the-way place that had been left there for more than a year. In the spring, by some means, a tomato seed got there, and a plant grew on top of that ash heap over 3 ft. high. It was left alone, and no attention paid to it. But that tomato plant with only 3 ft. of coal ashes under it gave me more tomatoes than any one plant in my garden. I would like to have an analysis of coal ashes that have been left in the weather for a year or more, for it does seem that they have some power of absorbing some plant food. As a mulch under gooseberry and currant bushes, I have found coal ashes very useful.

Tropical Industries.

TAPPING RUBBER TREES.

In reply to inquiries concerning the time for tapping rubber trees and how often they may be tapped, the following information comes to us from Malaya:—

It is important to make certain of the periods which should be allowed to elapse between tappings in order to get maximum yields. After having collected figures of yields on a large number of estates, it is difficult to lay down an absolute rule as to the procedure which experience shows to be the best. Carefully kept data on some estates show that, after a period of some three months' alternate days' tapping, the amount of latex decreases to an amount which is of less value than the cost of tapping, but after a rest of two months the trees, on the fourth or fifth tapping, again yield the maximum, which, after some forty tappings, begins to decrease. On some estates, trees have been tapped for three and a-half to four years, every other day without cessation, without any reduction in yield.

Five-year-old trees tapped twenty-four times in a year—that is, every fortnight—have given double the quantity of early-tapped trees every year, and have yielded 3 lb. of rubber per tree, but by this system the trees do not live longer than ten or twelve years.

The amount of yield does not always correspond to the number of tappings. The trees in one area, tapped daily or 264 times in the year, gave an average of 9 lb. of dry rubber each; while similar trees tapped 131 times, on alternate days, gave an average of 11 lb. In the first case, all the original bark had been removed, and in the latter only half the original bark was removed. Tapped every alternate day for six months, young trees will yield from $\frac{3}{4}$ to 1 lb. of dry rubber.

In tapping rubber, an expert white man is more than equal to two coolies. A trained coolie can cut 400 ft. in a day; therefore, to lay out a fixed task of trees per native labourer, taking 40 trees (18 in. in circumference) as equivalent to 400 ft., the task for trees of different diameter must be regulated proportionately. Thus, 40 by 18 being equal to 720, the circumference of the different trees being added together till they amount to 720 would be the native's task; he works at the same trees every day. It is estimated that three natives can collect rubber at the rate of 1 lb. per hour at a cost of 1s. 3d. per lb. A white man can do double this work. He would tap 80 trees daily throughout the season, always working on the same trees unless the alternate day system is adopted on the plantation.

A NEW SUBSTITUTE FOR RUBBER.

It has been left (says the "Financial World," 13th November) to a Russian chemist, named Plinatus, to make what certainly is a "real" imitation rubber. After three years of persistent experimenting and inventing, and, what is perhaps more important, the discovery of entirely new chemical reactions, an imitation rubber has been produced which, to the eye, is as real as the purest rubber.

This Plinatus rubber has been patented in Germany, and patents have been applied for in all foreign countries. In Paris one of its many uses has been the introduction of Plinatus rubber for both pneumatic and solid rubber tyres. This may seem contradictory, but the explanation is simple:

for outer tyres Plinatus cannot be used, but for the filling of the inner tubes it replaces air in the pneumatic tyres, and it replaces real rubber in the solid tyres. Cab proprietors in Paris have experimented with it for eighteen months, and so satisfactory are the results that the German company which bought the German rights and started a factory on the 1st instant have contracted with the patentees to establish a branch factory in Paris on or before the 1st December next, and in the meantime the German company are filling the wheels for Paris cabs. Speaking of the substance itself, we might point out that Plinatus rubber is tough, firm, pliable, highly elastic, and of the same consistency as real rubber. To the touch, it is identical with rubber, and in appearance difficult to distinguish. Light has no influence upon it; further, it is absolutely insoluble in benzine, ether, turpentine, petroleum, tetrachlor acid, &c., and entirely indifferent to all mineral and vegetable oils. It is the only rubber, real or imitation, that will withstand these oils and at the same time not swell. The prime cost of production is from 3d. to 8d. per lb., depending upon the uses for which it is intended. Coming back to one of its main uses—cab and other vehicle tyres—Plinatus rubber, promises to cause a revolution in the trade. The inner tubes are filled with Plinatus rubber, and produces a tyre of exceptional strength and durability. The drivers of Plinatus rubber tyres do not know the meaning of puncture or bursted tyres, and drive with the same perfect ease and comfort as the best pneumatic tyre. Compared with solid tyres, it has the enormous advantage in cost and, further, in durability and in elasticity, &c., hitherto only connected with pneumatic tyres. At the present time arrangements are in progress to supply 1,000 cabs in Paris with tyres filled with Plinatus rubber.

As regards the users of rubber, the "H. and C. Mail," 12th November, says:—Reports have been received indicating an enormously increased demand for tyres, and huge contracts are reported to have been placed by a syndicate interested in the taxi-cab business. Great extensions of the taxi-cab industry are anticipated, and with these extensions a great increase in the consumption of raw rubber for tyre manufacture. A number of manufacturers who have fixed up contracts for manufactured goods have apparently covered themselves by buying forward supplies. On the other hand, contracts usually given out at this time have been postponed, and the trade in this country must be suffering severely from the consumer's very natural dislike to buying at prices so much above the usual level. Investors in rubber-growing companies have persuaded themselves that it will be some time before the supply of rubber overtakes the demand.

RUBBER FROM THE BANANA.

If what Mr. Geo. C. Benson, of Georgetown, Demerara, says proves correct (says Ceylon "Tropical Agriculturist"), there is a very good time before the fortunate owners of banana plantations, but some practical demonstration will probably be required before it will be generally conceded that one banana tree will yield from 5 to 7 lb. of marketable rubber. By the way, good rubber is worth from 7s. to 8s. per lb. in London to-day. Writing to the Demerara "Chronicle," on 6th August, Mr. Benson says:—

"To dispel all doubt as to whether or not the banana is a rubber-producing plant let the following simple plan be followed:—Cut one of the lower branches of a banana-tree near the trunk,* and then let the falling juice drip either into a wine-glass or into an egg-cup till it is about half full; then let either the wine-glass or the egg-cup stand for about six hours, after which moisten the fingers and take off the film that has formed on the top of the

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* As the banana plant has no branches, we fail to see how a "lower branch" can be cut off.—Ed. "*Q.A.J.*"

juice. If the fingers are moist or wet the film can be pressed and rubbed between the fingers, and then a beautiful and pink-like ball of very soft rubber will be the result.—I am, Sir, &c., GEORGE C. BENSON.

"Lot 102, Carmichael street, Georgetown, 6th August, 1909."

Mr. Benson sends the "Chronicle" the following:—

"One mature banana-tree will give from 5 to 7 lb. of marketable rubber when it is properly admixed. The rubber is fully worth 60 cts. (2s. 6d.) per lb. All that the former now gets is about 20 cts. (10d.) per bunch for his plantains or bananas:—

	$
6 lb. of rubber at 60 cts. (2s. 6d.)	3·60 (15s.)
1 bunch of bananas	·16 (8d.)
	3·76 (15s. 8d.)
Less cost of admixing 6 lb. of rubber about	·36? (1s. 6d.)
Estimates about	3·40 (14s. 2d.)"

It would be interesting to hear what Mr. J. B. Carruthers has to say with regard to this.—"Proceedings of the Agricultural Society of Trinidad and Tobago," September, 1909.

In a communication to the "India Rubber World," Mr. Benson says:—"With regard to the remarks on banana rubber which appeared in your journal of the 6th September, it is necessary to point out that it is an admixable rubber, and that when compounded with another rubber adds to the weight of that rubber, without deteriorating. This appears from our many experiments to be the effect; and as this fact when known may benefit the farmers of the West Indies as well as other localities, it is certainly worth publicity in your journal. The quantity of rubber from each banana-tree, after the bunch of bananas is gathered, is generally highly satisfactory."

RUBBER NOTES.

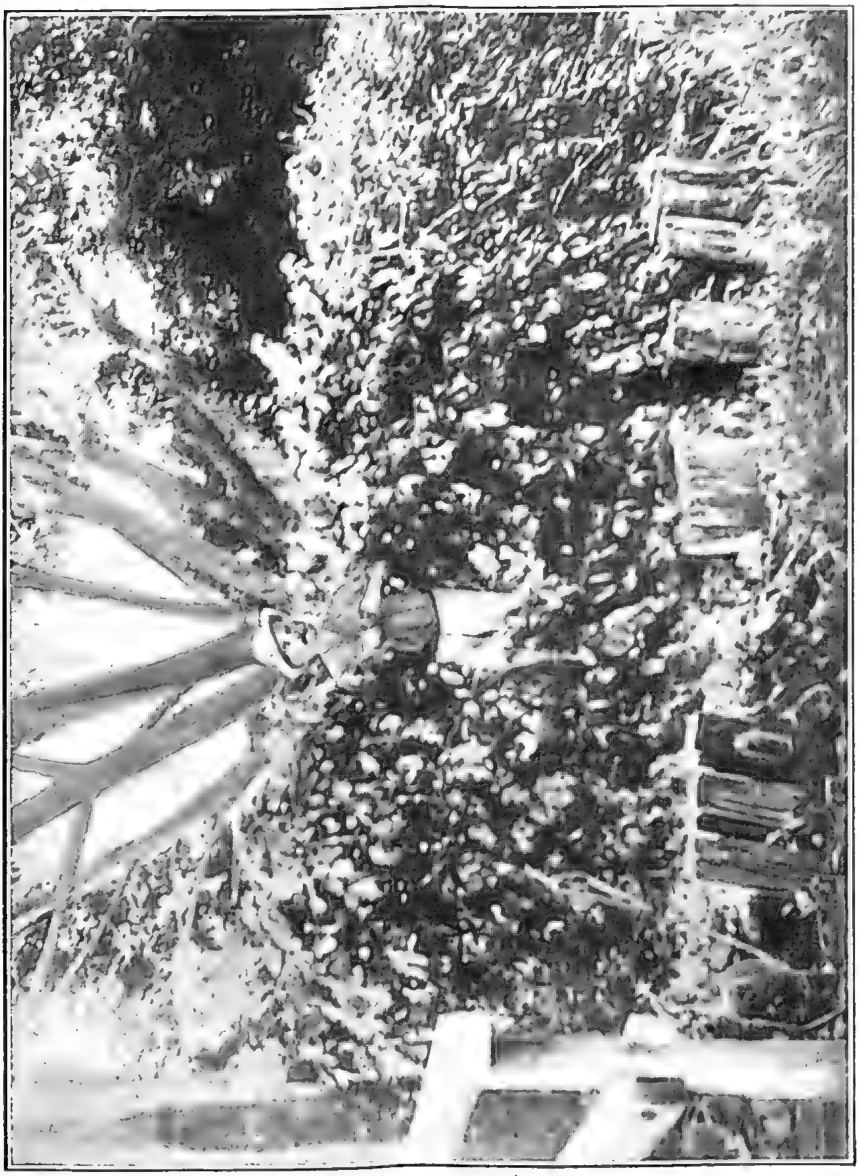
GUANO FOR RUBBER TREES.

A planter from the Dutch Islands, in a communication to the "Agricultural Bulletin of the Straits Settlements," stated that he had a remarkable increase in the growth of his Parà rubber trees after using imported guano. A small quantity was put round each tree in a shallow trench surrounding the tree, and covered in with soil. The cost was three cents (1½d.) per tree. This inexpensive method of manuring might be very useful in bringing on young plants.

Funtumia elastica.

The Funtumia as a cultivated tree has had but little reputation as a high-class rubber-producer both in the matter of returns and in its product (says the "Agricultural Bulletin of the Straits Settlements"). We are glad to see signs that it is not so bad as its reputation. A note in the "India Rubber World" from Mr. J. W. Johnson, manager of the Mabira Forest Rubber Company, Uganda, states that Funtumia rubber has fetched recently as much as 6s. 4½d. per lb., the third highest price in the market. He hopes to so improve this rubber that it will top the best Parà. The above estate turned out 10,000 lb. of rubber in 1907, and 35,137 lb. in 1908, and 26,000 lb. in the first six months of 1909.

Plate XVI.



Coffee under Shade.

COFFEE CULTIVATION IN QUEENSLAND.

By H. NEWPORT, Instructor in Tropical Agriculture.

SHADE.

The question as to whether shade for coffee is required is one of some little difficulty. At first coffee was universally planted and cultivated without shade. It was then noticed that it lived longer and apparently thrived better, in some localities at least, under permanent shade, and a reaction set in, and estates sheltered by the shade of various and sundry trees became the vogue. Later it began to be questioned as to whether the disadvantages outweighed the benefits of this method of culture. It was found that shade reduced the crops by one-third to one-half, and at the same time somewhat increased the cost of picking, but that it also reduced the cost of maintenance of estates by almost eliminating weeding and pruning was admitted. The fact that the shade of ordinary trees such as were then used being found to utilise an amount of plant food that would otherwise be available for the coffee, had almost carried the day, and demonstrated that shade in coffee plantations was a huge cultural mistake, when deeper investigations made a discovery that put a new complexion on the whole question. This was, that certain trees of the plant order of Leguminosæ have the same properties as many smaller plants, such as beans and peas, used for manurial purposes, that is, that they acted as hosts for certain nitrogenous bacteria which had the power of obtaining free nitrogen from the atmosphere and turning it into nitrates and nitrites, and rendering it available as plant food. The presence of these bacteria being evidenced by the presence of nodules on the roots, in the same way as on cowpeas, &c., so that these trees stood in virtually the same relation to permanent crops, such as coffee, cocoa, &c., as cowpeas, beans, &c., stood to annual or serial crops. This meant that while the objections to, or disadvantages of shade—viz., reduction of amount of crop per tree, slower ripening, increased cost of picking, and, especially if overdone and in a wet climate, an increased tendency to fungoid diseases remained, the advantages of the reduction of weeding and pruning, and the safe-guarding against frost, wind, drought, or wash in floods was materially enhanced by an appreciable increase in the fertility of the soil. While, therefore, coffee would not cease to develop properly, or thrive continuously without shade, while labour is at so great a premium as it is at present in Queensland, the use of shade, provided only it is of the right kind, offers advantages that outweigh the objections. While shade may be generally advantageous, it nevertheless remains a matter which must be decided by the grower in view of his local conditions, and in conjunction with other economic considerations.

In the Northern Territory and West of the coastal ranges in Queensland, where the climatic conditions may be almost termed arid, shade would be more or less essential to success, but at elevations or at greater latitudes in the coastal portions of Queensland, where the sun is not so fierce and the rainfall copious and reliable, the conditions may be such as to render it more or less unnecessary if not prejudicial.

Where shade is determined on, it is advisable to plant it at the same time as, or soon after, the coffee, and not to plant the coffee under existing trees. The following are suitable leguminous trees that will do well anywhere in Queensland:—The Gwango (*Pithecolobium saman*), the Nicaraguan Madre-de-Cacao (*Gliricidia maculata*), the Rain-trees (*Albizzia stipulata*), Siris (*Albizzia lebbek*), *Albizzia moluccana*, and almost any of the Erythrinas, several of which are indigenous. These should be planted 25 to 40 ft. apart, according to the size the trees ultimately attain.

When pruning the coffee, such of the branches of the shade trees as are within reach should be cut back as high as can be conveniently reached.

Bananas make a useful shade for coffee, and while the planting of bananas as shade is not advocated, the planting up of areas leased for bananas with coffee would be quite successful as far as the growth of the coffee is concerned, and later, when the cultivation of the bananas is given up, as is usual in four to six years, a valuable plantation of a permanent nature and an age to show returns would be left, instead of, as so often at present, nothing, or worse than nothing, a field of noxious weeds.

Advantage may be taken of trees in coffee culture other than for shade, as, for instance, when, after clearing, a field is found to be exposed to wind, when belts of hardy trees, such as the *Grevillea robusta*, &c., may be planted on the windward side, or in rows through the coffee across the line of the wind. Also on elevations where slight frost may be feared, coffee can be successfully grown in narrow clearings of not more than a chain wide, cut north and south, with areas of similar width of standing scrub left between such clearings.

CATCH CROPS.

It is often asked whether catch crops can be grown between the lines of coffee, at least during the first few years.

The space is generally there for three years, more or less, and it may seem a pity to have to keep it clean weeded and yet not utilise the ground. Such inter-cultivation, however, involves either exhaustion of the plant foods for the permanent crop—*i.e.*, the coffee trees, or intense cultivation—*i.e.*, ample tilth and manuring, which, with labour at a premium, is generally not afforded the field. Hence it will be found more satisfactory all round if the field is left entirely to the coffee trees, since they will want all the space as well as plant food in a comparatively short time; and the other farm crops be grown in a separate area.

It is a cultural mistake to think that maize or millet (sorghums, &c.) are any advantage to coffee. Any shade or protection afforded is more than counterbalanced by the heat, shutting out of air, and utilisation of moisture and plant food the coffee would otherwise get. If the soil be somewhat sandy a crop of Ground Nuts (*Arachis hypogœa*) might be produced, but these will subsequently be found troublesome to eradicate and a woeful attraction to rats and similar vermin. Cotton of the smaller Upland varieties might also be grown, but a note of warning must be given against any form of root crops—ginger, turmeric, yams, and especially sweet potatoes are particularly detrimental to the coffee. Bananas are about the only crop that can be grown with coffee with success. The banana does not seem to take from the soil just what the coffee requires, and the shade is not too dense for the coffee. By the fourth or fifth year at latest, however, these should be cut out.

MANURING.

It is not proposed to go fully into the matter of manuring in this treatise for the reasons that it is a big subject, and that, ordinarily speaking, the soils of Queensland are so rich that the manuring of coffee is not likely to be required for many years. Manuring, of course, becomes necessary in estates that have for many years been growing the one staple in the same spot, but is expensive, and should not be required in this country for at least ten years, even on the poorer lands. Where artificial or chemical manures are used they should be applied superficially when the berries are beginning to form milky kernels. These manures should be mixed after a careful study, and analysis, if possible, of the soils. Bulk or heavy manures are best applied after the crop is off; generally the work follows the pruning, and the prunings are at the same time buried. Bulk manures, such as farmyard or cattle manures, are difficult to obtain in this country; but to the matter of saving waste

material for manurial purposes on a mixed farm a great deal more attention could be given by the Queensland settler with advantage.

In coffee the pulp will form the foundation of a useful compost, which may be built up near the pulping-house, for saving of transport, with a layer of pulp, say 6 in. thick, a sprinkling of lime, a layer of dead leaves, weeds, and organic rubbish, and a layer of soil alternately. All ashes, animal and vegetable matter from the house and buildings may be added with advantage. This compost should be left for a year before being used, and then the admixture of a small quantity of bone dust adds to its value as a fertiliser. This may be spread over the ground and ploughed, forked, or dug in, or where this is not possible be put in shallow pits behind the trees, well mixed with soil.

This compost is often used for what may be called the irregular manuring, when only trees that have overborne, or for other reasons want toning up to bring them to a par with the rest of the field, are treated.

By far the cheapest method of manuring is, of course, green manuring. With coffee the use of beans and peas is out of the question, on account of their climbing propensities, as the coffee-trees would be smothered; but any non-climbing leguminous plant, such as the Pigeon Pea (*Cajanus indicus*), may be used to advantage, and ploughed or dug in, especially during the first few years after planting or during the wet seasons when weeding is difficult, as mentioned under the heading of "Weeding."

[TO BE CONTINUED.]

SISAL HEMP.

Considerable interest (says the "Australian Sugar Journal") attaches to the growth of sisal hemp, and the manufacture of fibre therefrom, which has passed the experimental stage in some parts of Queensland. Mr. T. H. Wells, of Farnboro, Childers, is now busy with harvesting operations, and his mill is working to his entire satisfaction, and turning out nearly a ton of fibre a day in fine weather; on one occasion the day's work produced 22 cwt. The fibre is being shipped as fast as it can be pressed, and a recent steamer from Maryborough brought 70 bales. It has been Mr. Wells' idea, that by this means profitable occupation can be found for cane-cutters waiting for the sugar season to begin, and it would seem that sisal hemp is destined to become a valuable addition to the productiveness of sugar districts.

To this we ["Q.A.J."] may add that the cultivation of sisal hemp in Queensland, stimulated in a great degree by Mr. Wells' example and success, is gradually increasing. Every year sees larger areas placed under the product, particularly in the Gladstone and Cairns districts. Within the last few months also, several tons of sisal hemp have been produced in Papua and sold f.o.b. at Port Moresby at £28 per ton. The yield in that territory being on an average $1\frac{1}{2}$ tons per acre after three years' growth, with wages (including rations) £1 per month, it may well be understood what splendid profits may be made in this industry in a black labour country; and yet Queensland growers can enter into competition with such tropical countries, and make a bigger profit from sisal than from many other crops.

Science.

EXTRACTION OF RAMIE FIBRE BY PETROL SOAP.

The difficulty of extracting ramie fibre by machinery has hitherto been the stumbling block in establishing the ramie industry in Queensland, where the plant grows to perfection, as well as in many other countries. What is wanted is some method of extraction of the fibre which will be at once efficient, rapid, and simple. Unfortunately, no machine has yet been invented by which these results can be obtained. The great difficulty is to get rid of the glutinous substance which binds the fibres together, and which resists all mechanical efforts for its removal.

From a short article on the subject in "l'Agronome Tropicale," Brussels, it would seem as if there were some hope of this difficulty being overcome. The article in question says:—

For a long time experiments have been carried on with a view to extracting the fibre of the ramie plant, the beauty of which is equal to that of silk. The Chinese, by processes solely applicable owing to the extreme cheapness of hand labour in China, obtain from ramie a fibre so beautiful that they manufacture from it the "crêpe de chine." But it would be impossible to make a commercial success of an industry employing such means.

From numberless experiments which have been made and study of the subjects at meetings and by competitions, the only result has been that the mechanical processes employed can succeed in producing nothing but narrow strips (ribbons), a coarse fibre useful only for rope-making, but from which the silky fibre cannot be prepared. [The writer probably means "profitably prepared," because the silky fibre has frequently been obtained in England by expert manipulators such as Mr. Jas. Anderson, Glasgow, and Mr. Radclyffe, and has been woven into fine cloth and silk-like material.—Ed. "Q.A.J."] The reason for this impossibility lies in the fact that the ramie fibres are closely united by a gum which resists all mechanical action. Various methods of steeping and "retting" in water have also been tried, but without, so far, yielding completely satisfactory results.

In a communication to the National Society of Agriculture of France, July, 1909 (*see* Bulletin of the Society), Mr. J. Dybowski says that it appears as if it would be actually possible to achieve the desired result by solvent chemicals. A chemist (M. Kuess) has lately shown that he has manufactured a soap containing almost 40 per cent. of petrol which it is impossible to separate from it after its manufacture. This product gives excellent results in practice. A large number of fibres, notably ramie, the agglomeration of which has hitherto resisted the action of all chemical solvents were by this means very easily separated. Thanks to this discovery by M. Kuess, it will perhaps be possible to make advantageous use of a heavily yielding plant, and prepare, on a payable commercial scale, a fibre with tissues of extreme fineness.

General Notes.

HOW TO MAKE MEAT TENDER.

The toughest meat may be rendered perfectly tender by rubbing it with the juice of the papaw fruit, or even by wrapping it up in papaw leaves for a few hours. This method is much preferable to the old English plan of making meat tender.

In old days, says Dr. Lyon Playfair in his lectures on the Rearing and Feeding of Cattle, "it was a barbarous custom to render bacon delicate by whipping pigs to death." The whipping did what exercise before death does for the flesh of more active animals. A hunted hare makes notoriously tender eating. Before cattle are killed in Rome it is, or was, usual to drive them fast round the city; the pace was maintained by the goads of mounted drivers, who keep the steers going. When the run is over, the cattle are driven to the slaughter-house. The tenderness thus acquired by the meat is described as "an artificial state of decay."

BRITISH BANANAS.

The average number of bananas on a good Queensland-grown bunch of Cavendish variety is about 10 dozen. It has remained for a British grower at Tunbridge Wells, county of Kent, to excel this. He grew two banana "bushes" (which term, by the way, is just as applicable to the banana plant as it is to the Victorian statesman's "sugar bushes") in a hothouse where a constant temperature of 100 degrees Fahr. was maintained. The result was two bunches, each bunch containing 200 bananas or 16⅓ dozen. "Lloyd's News," from which we get this information, states that a temperature of 100 degrees "has to be" maintained. Why? The average annual temperature in Queensland is nothing like 100 degrees, and yet we produce splendid bananas all the year round, and the necessary heat is supplied without cost by a beneficent climate.

TESTING THE SOIL FOR LIME.

Here is a very simple and very cheap test to determine whether lime is present in any soil:—

"Take a few shovelfuls of soil from different parts of the field or orchard, and dry, pulverise, and mix them thoroughly together. Take a few ounces of this powder and reduce to ashes on an iron shovel over a fire. Put these ashes when cool into a glass tumbler, and mix with them as much water as it will take to cover them. Stir this with a glass rod or wooden stick, but not with any thing metallic. To this paste add 1 oz. of hydrochloric acid, which is commonly sold as muriatic acid or spirits of salts, the mixture being stirred all the time. If a fairly brisk effervescence takes place, it may be taken for granted that the soil contains a fair percentage of lime, but if little or no effervescence takes place the soil contains little or no lime."

If there is not lime enough in the soil, it must be acid; therefore needs liming. This is far better, and probably more positive than the litmus test, which amounts to little enough sometimes in the laboratory when conditions are far more positive than they are when samples of field soil are involved.—"Farmer."

CURE FOR DISTEMPER IN DOGS.

Replying to an inquiry by a correspondent on the subject of distemper in dogs, Mr. A. H. Cory, Government Veterinary Surgeon, advises the following treatment:—

Good nursing is the chief factor in dealing with distemper. The dog should be fed on good, nutritious, and easily-digested food, such as milk, tripe, &c.; also, he must be kept warm and comfortable, and not be allowed to lie on damp ground. One of the best pills I know of is made up as follows:—

P. Ipecac Co	gr. ½
Hyd. c. Creta	gr. ½
Sodii Bicarb.	gr. 1
Sacch. Lac.	gr. 2

Give one or two pills three times daily, according to the size and age of the dog.

Another useful recipe is given by Mr. Cory for the treatment of

SCOURS IN A YOUNG BULL.

In a case lately referred to him, he considered that there was apparently some specific disease causing the bull to scour—probably tuberculosis or worms—and suggested giving him twice daily—

Sulphate of iron	2 drachms
Nux vomica	1 drachm
Prepared chalk	1 ounce.

Mix in a pint of cold water and give as a drench.

HOUDANS.

Some inquiry having been made from North Queensland to the Department of Agriculture and Stock for Houdans, the matter was referred to the Poultry Expert, at the Queensland Agricultural College (Mr. Hindes) for his opinion on the suitability of the breed for that portion of the State. He advises that the Houdan is a splendid all-round fowl, but, owing to its large crest and top-knot, it is subject to colds in wet weather. He does not, therefore, consider that the breed would be suitable for the Cairns climate; neither does he know of anyone who keeps the breed, and can, therefore, give no information as to where birds of that class can be obtained.

Answers to Correspondents.

COW WITH SORE HEELS.

This is a very common trouble during the present wet season. If you have a number of your cows affected, the best way to deal with it is to make a shallow pool and put in it about 50 gallons of water in which have been dissolved about 5 lb. of sulphate of copper. The cattle should be made to stand in this for about 10 minutes. If only one or two are affected, then you may treat the animals separately. Wash the heels with worm disinfectant, such as one tablespoonful of cyllin in a pint of water, and smear the ulcers over with carbolic or iodoform ointment.

BAGASSE.

FARMER, Nerang—

The term *Bagasse,* erroneously called in Queensland "*Mégasse,*" came from the South of France originally, and thence to the sugar-producing colonies. *Bagaça* is the covering matter of the grape seed or of the olive deprived of their juice by pressure and forming what is known as "marc" or squeezed fruit. As we know, it has been applied to sugar-cane which has been passed through the rollers; this term Bagasse was formerly applied to the stems of indigo taken from the steeping ditches after fermentation.

THE VALUE OF LIME IN AGRICULTURE.

J. WILLIAMS, Texas—

The use of lime in agriculture is of more importance than you seem to think. If there is no lime in a soil, no crop can thrive on it, as all plants require more or less of it. It acts in two ways. It is not a direct fertiliser, but it acts with acids in making clay soils more friable and pervious to water, and it promotes the decomposition of vegetable matter and organic manures and the formation of nitrates in the soil. It also acts in rendering available all three of the plant foods which lie dormant in the soil. That is its chemical action. Its physical action, as we have said, is to render stiff clays easier to cultivate and better able to supply moisture, heat, and air to the plant. It improves the texture of sandy soils, making them more compact and better able to retain moisture and fertilisers. The time to apply lime is a little while before planting a crop. It should not be ploughed in. It is of great value in destroying insects, worms, and fungi. As to how much to use, some people put on from 2 to 5 tons per acre at intervals of from five to ten years. Others put on half a ton annually. You should note that some plants, such as water-melons, peas, and other legumes, and potatoes, are injured by lime; whilst sugar-cane, beetroot, onions, celery, lettuce, parsnips, cabbage, maize, rock-melons, tobacco, and fruits are benefited by it.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	MAY. Prices.
Apples (Eating), per case	5s. to 8s.
Apples (Cooking), per case	3s. 6d. to 5s.
Bananas (Cavendish), per dozen	1½d. to 3½d.
Bananas (Sugar), per dozen	2d. to 3½d.
Custard Apples, per half-case	1s. 6d. to 3s.
Grapes, per lb.	...
Lemons (Italian), per half-case	10s. to 11s.
Lemons (Lisbon), local, per case	2s. to 3s. 6d.
Mandarins, per half-case	4s. 6d.
Mangoes, per case	...
Nectarines, per quarter-case	...
Oranges (Italian), per large case	...
Oranges (Local), per gin case	5s. to 6s.
Papaw Apples, per quarter-case	2s. 6d. to 3s.
Passion Fruit, per quarter-case	4s. to 4s. 6d.
Peaches, per quarter-case	...
Pears, per quarter-case	3s. 6d. to 5s.
Persimmons, per gin case	2s. 6d. to 5s.
Pineapples (Ripley Queen), per dozen	6s. to 7s.
Pineapples (Smooth), per dozen	6s. to 7s.
Pineapples (Rough), per dozen	1s. 6d. to 5s. 6d.
Plums, per quarter-case	...
Quinces, per case	1s. 6d. to 1s. 9d.
Rosellas, per sugar-bag	1s. to 2s.
Tomatoes, per quarter-case	1s. to 2s. 6d.
SOUTHERN FRUIT MARKET.	
Apples (Local), choice, per case	6s. to 7s. 6d.
Apples (Jonathan's), per case	5s. to 6s. 6d.
Apples (Cooking), per case	3s. 6d. to 5s.
Bananas (Queensland), per case	8s. to 9s.
Bananas (Queensland), per bunch	2s. 6d. to 4s.
Bananas, G.M. (Fiji), per case	16s. 6d. to 18s.
Bananas, G.M. (Fiji), per bunch	5s. 6d. to 11s. 6d.
Cocoanuts, per dozen	2s. 6d. to 3s.
Grapes, per box	3s. to 4s.
Lemons (Italian), per half-case	10s. to 11s.
Lemons (Local), per gin case	3s. 6d. to 4s.
Mandarins, choice, per half-case	4s. to 4s. 6d.
Mandarins (Queensland), per bushel case	7s. to 8s.
Oranges (Local), choice, per gin case	5s. to 6s.
Oranges (Queensland)	5s. 6d. to 6s.
Passion Fruit (choice), per half-case	4s. to 5s.
Peaches, per half-case	3s. to 5s.
Pears (choice), per gin case	3s. 6d to 5s. 6d.
Peanuts, per lb.	5½d.
Persimmons (choice), per half-case	2s. 6d. to 3s.
Pineapples (Queensland), Ripley, per case	8s. to 10s.
Pineapples (Queensland), common, per case	8s. to 10s.
Pineapples (Queensland), Queen's, per case	8s. to 10s.
Plums, per half-case	3s. to 5s.
Quinces, per gin case	1s. to 3s. 6d.
Rock melons per gin case	4s. to 4s. 6d.
Tomatoes, choice, per half-case	3s. to 3s. 6d.
Water melons (Local), large, per dozen	4s. 6d. to 5s.
Water melons, medium and small, per dozen	1s. to 3s. 6d.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MAY.

Article.		MAY. Prices.
Bacon, Pineapple	lb.	1s. 1½d.
Barley, Malting	bush.	3s. to 3s. 6d.
Bran	ton	£5 5s.
Butter, Factory	cwt.	9d. to 9½d.
Chaff, Mixed	ton	£3 10s. to £4 15s.
Chaff, Oaten	"	£4 15s. to £5 5s.
Chaff, Lucerne	"	£4 5s. to £4 15s.
Chaff, Wheaten	"	£2 10s.
Cheese	lb.	4½d.
Flour	ton	£10 to £10 5s.
Hay, Oaten	"	£5 15s.
Hay, Lucerne	"	£2 to £3 10s.
Honey	lb.	2¾d.
Maize	bush.	2s 8d.
Oats	"	3s. to 3s. 8d.
Pollard	ton	£5 5s.
Potatoes	"	£6 15s. to £7
Potatoes, Sweet	cwt.	1s. 6d. to 1s. 7d.
Pumpkins	"	2s. 7d. to 2s. 10d.
Wheat, Milling	bush.	3s 9d.
Wheat, Chick	"	3s. 9d.
Onions	ton	£4 15s.
Hams	lb.	...
Eggs	doz.	1s. 2d. to 1s. 7d.
Fowls	pair	2s. 6d. to 3s. 9d.
Geese	"	...
Ducks, English	"	3s. to 3s. 6d.
Ducks, Muscovy	"	3s. to 3s. 6d.
Turkeys (Hens)	"	5s. 6d. to 6s. 6d.
Turkeys (Gobblers)	"	8s. to 12s.

ENOGGERA SALEYARDS.

Animal.	MAY. Prices.
Bullocks	£8 to £9.
Cows	£5 7s. 6d. to £7 10s.
Merino Wethers	16s. 9d.
Crossbred Wethers	20s.
Merino Ewes	15s.
Crossbred Ewes	16s.
Lambs	13s. 6d.

Farm and Garden Notes for July.

FIELD.—The month of July is generally considered the best time to sow lucerne, for the reason that the growth of weeds is then practically checked, and the young lucerne plants will, therefore, not be choked by them, as would be the case if planted later on in the spring. If the ground has been properly prepared by deep ploughing, cross-ploughing, and harrowing, and an occasional shower occurs to assist germination and growth, the lucerne will thrive so well that by the time weeds once more appear it will be well able to hold its own against them. From 10 to 12 lb. of seed will be sufficient for an acre. This is also the time to prepare the land for many field crops, such as potatoes, maize, oats, and barley for green fodder; also, rye, vetches, tobacco, cotton, sugar-cane, field carrots, mangolds, swedes, canaigre, &c. Early potatoes, sugar-cane, and maize may be planted in very early districts, but it is risky to plant potatoes during this month in any districts liable to late frosts or in low-lying ground. Under such conditions, it is far better to wait until well into the following month. The greatest loss in potatoes and sugar-cane has been, on more than one occasion, experienced in September, when heavy frosts occurred in low-lying districts in the Southern portion of the State. During suitable weather, rice may be sown in the North. The coffee crop should now be harvested, and yams and turmeric unearthed.

KITCHEN GARDEN.—Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. Never walk over the land during wet weather with a view to sowing. The soil cakes and hardens, and good results cannot then be expected. This want of judgment is the usual cause of hard things being said about the seedsman. In fine weather, get the ground ploughed or dug, and let it lie in the rough till required. If harrowed and pulverised before that time, the growth of weeds will be encouraged, and the soil is deprived of the sweetening influences of the sun, rain, air, and frost. Where the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

FLOWER GARDEN.—Winter work ought to be in an advanced state. The roses will now want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, coxcombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

Orchard Notes for July.

THE SOUTHERN COAST DISTRICTS.

The notes for the month of June apply to July as well. The first crop of strawberries will be ripening during the month, though extra early fruit is often obtained in June, and sometimes as early as May, under especially favourable conditions. Look out for leaf-blight, and spray for same with Bordeaux mixture, also watch for the first signs of the grey mould that attacks the fruit, and spray with the sulphide of soda wash. The larvæ of the cockchafer, that eats the roots of strawberries, should be looked for, and destroyed whenever found. Pruning of citrus and other fruit trees may be continued; also, the spraying with lime and sulphur. Where the ringing borer, that either attacks the main trunk or the branches at or near where they form the head of the tree, is present, the main stems and trunks should either be painted or sprayed with the lime and sulphur wash during the month, as the mature beetles that lay the eggs that eventually turn to the borers sometimes make their appearance during the month, and unless the trees are protected by the wash they lay their eggs, which hatch out in due course and do a lot of damage. Keep the orchard clean, so that when the spring growth takes place the trees may be in good condition. There is usually a heavy winter crop of pineapples ripening during this and the following months, particularly of smooth leaves. See that any conspicuous fruits are protected by a wisp of grass, as they are injured not only by frost but by cold westerly winds.

TROPICAL COAST DISTRICTS.

See the instructions given for the month of June. Keep the orchards clean and well worked. Prune and spray where necessary.

SOUTHERN AND CENTRAL TABLELANDS.

Where pruning of deciduous trees has not been completed, do so this month. It is not advisable to leave this work too late in the season, as the earlier the pruning is done after the sap is down the better the buds develop—both fruit buds and wood buds; thus securing a good blossoming and a good growth of wood the following spring.

Planting can be continued during the month; if possible, it should be finished this month, for though trees can be set out during August, if a dry spell comes they will suffer, when the earlier planted trees, which have had a longer time to become established, will do all right—provided, of course, that the land has been properly prepared prior to planting, and that it is kept in good order by systematic cultivation subsequent to planting.

Do not neglect to cut back hard when planting, as the failure to do so will result in a weakly growth.

As soon as the pruning is completed, the orchards should get their winter spraying with the sulphur limewash, and either with or without salt, as may be wished. See that this spraying is thoroughly carried out, and that every part of the tree is reached, as it is the main treatment during the year for San José and other scale insects, as well as being the best time to spray for all kinds of canker, bark-rot, moss, lichens, &c.

Where the orchard has not been ploughed, get this done as soon as the pruning and spraying are through, so as to have the land in good order for the

spring cultivations. See that the work is well done, and remember that the best way to provide against dry spells is to keep moisture in the soil once you have got it there, and this can only be done by thorough and deep working of the soil.

When obtaining trees for planting, see that they are on good roots, and that they are free from all pests, as it is easier to prevent the introduction of pests of all sorts than to eradicate them once they have become established. Only select those varieties that are of proved merit in your district; do not plant every kind of tree that you see listed in a nurseryman's catalogue, as many of them are unsuited to our climate. The pruning of grape vines may be carried out in all parts of the tablelands other than the Stanthorpe district, where it is advisable to leave this work as long as possible, owing to the danger of spring frosts.

Where grape vines have been well started and properly pruned from year to year, this work is simple; but where the vines have become covered with long straggling spurs, and are generally very unsightly, the best plan is to cut them hard back, so as to cause them to throw out good strong shoots near the main stem. These shoots can be laid down in the place of the old wood in following seasons, and the whole bearing portion of the vine will be thus renewed.

Where vineyards have been pruned, the prunings should be gathered and burnt, and the land should receive a good ploughing.